



CALFED BAY-DELTA PROGRAM

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**SUMMARY OF ECOSYSTEM RESTORATION PLANS PERTAINING
TO THE ECOLOGICAL RESOURCES OF THE BAY-DELTA AND
ITS WATERSHED**

NOVEMBER 15, 1996

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CALFED BAY-DELTA PROGRAM

SUMMARY OF ECOSYSTEM RESTORATION PLANS PERTAINING TO THE ECOLOGICAL RESOURCES OF THE BAY-DELTA AND ITS WATERSHED

INTRODUCTION

The mission of the CALFED Bay-Delta Program (CALFED) is to develop a long-term comprehensive plan to restore ecosystem health and improve water management for beneficial uses of the Bay-Delta System. CALFED staff has identified three alternatives that include a range of water storage options and differ in their water conveyance systems. Each alternative shares a common program that includes water use efficiency measures, ecosystem restoration, water quality protection, and levee improvements. CALFED staff is developing an Ecosystem Restoration Program Plan (ERPP) to define the Ecosystem Restoration Common Program component. The goal of ERPP is to improve and increase aquatic and terrestrial habitats and improve ecosystem functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species.

The first step in ERPP development was identifying a preliminary list of ecosystem elements for which program implementation objectives and targets would be established. A program work team of resource experts was assembled from CALFED staff and consultants. The work team sought information from technical experts from agencies and stakeholders to assemble a list of draft ecosystem elements that would be addressed in ERPP. The work team reviewed existing information to document recommendations made by others whose goals were to restore or recover important habitat types and associated plants and animals, listed species, and fish and wildlife that have high commercial and recreational value. This existing information, together with information provided by resource agency staff and stakeholders, formed the basis by which the work team developed preliminary draft implementation objectives and targets.

This report presents summaries of documents relevant to CALFED and reviewed by the ERPP work team. These summaries provide a common reference point for CALFED, agencies, and stakeholders in relation to previous ecosystem restoration planning or implementation documents. In addition to providing guidance in formulation of implementation objectives and targets, the summaries also provide information that will prove useful for development of program actions to implement targets and the subsequent ERPP implementation plan. Four broad categories of documents are summarized:

- species listing proposals/petitions,
- species management plans,
- species recovery plans, and
- habitat management plans.

Summaries include, if provided, descriptions of each document's:

- geographic scope,
- purpose,
- management recommendations,
- funding sources,
- status of implementation of recommendations,
- relationship to other planning documents,
- contact person, agency, or organization, and
- document citation.

The documents reviewed do not represent all plans that could provide important guidance for developing program implementation objectives and targets. Consequently, the work team will continue to review documents throughout the ERPP development process.

LISTING PROPOSALS/PETITIONS

**A PETITION TO PLACE THE CALIFORNIA RED-LEGGED FROG
ON THE LIST OF ENDANGERED AND THREATENED WILDLIFE AND PLANTS**

GEOGRAPHIC SCOPE: The Central Valley and Pacific Mountain Range of California and selected areas of Oregon.

PURPOSE: This petition presents the data and interpretation to support listing the California Red-Legged Frog as threatened and endangered by the U.S. Fish and Wildlife Service.

RECOMMENDATIONS: Pursuant to provisions of the Federal Endangered Species Act of 1973, a petition to the U.S. Fish and Wildlife Service to list the California Red-Legged Frog as endangered or threatened as specified, depending on degree of threat, in different parts of its range.

FUNDING: Not applicable.

STATUS OF IMPLEMENTATION: Submitted; listing as federal threatened species in 1996.

RELATIONSHIP TO OTHER PLANS Closely associated with the petition to list the western pond turtle (*Clemmys marmorata*) because distribution of both species show overlap of ranges.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340. (916) 979-2113.

SOURCE: Jennings, Mark R., Marc P. Hayes, and Dan C. Holland. 1992. A petition to the U.S. Fish and Wildlife Service to place the California Red-Legged Frog (*Rana aurora draytonii*) and the western pond turtle (*Clemmys marmorata*) on the list of endangered and threatened wildlife and plants.

**A PETITION TO PLACE THE WESTERN POND TURTLE ON THE LIST
OF ENDANGERED AND THREATENED WILDLIFE AND PLANTS**

GEOGRAPHIC SCOPE: Statewide

PURPOSE: This petition presents the data and interpretation to support listing the western pond turtle (*Clemmys marmorata*) as threatened and endangered by the U.S. Fish and Wildlife Service.

RECOMMENDATIONS: Pursuant to provisions of the Endangered Species Act of 1973, a petition to the U.S. Fish and Wildlife Service to list the western pond turtle as endangered or threatened as specified, depending on degree of threat, in different parts of its range.

FUNDING: Not applicable.

STATUS OF IMPLEMENTATION: Has been submitted.

RELATIONSHIP TO OTHER PLANS: Closely associated with the petition to list the California Red-Legged Frog (*Rana aurora draytonii*) because distribution of both species shows overlap of ranges.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340. (916)979-2113

SOURCE: Jennings, Mark R., Marc P. Hayes, and Dan C. Holland. 1992. A petition to the U.S. Fish and Wildlife Service to place the California Red-Legged Frog (*Rana aurora draytonii*) and the western pond turtle (*Clemmys marmorata*) on the list of endangered and threatened wildlife and plants.

SPECIES MANAGEMENT

ANALYSIS AND PROJECT PROPOSAL TO FACILITATE DESIGN AND ENGINEERING TO CORRECT BUTTE CREEK SALMON MIGRATION PROBLEMS

GEOGRAPHIC SCOPE: Sacramento River Basin, Butte Creek.

PURPOSE: The decline of Butte Creek chinook salmon and steelhead populations has been attributed to several instream deficiencies including inadequate flows, unscreened diversions, and inadequate passage over diversion dams. The purpose of this proposal was to correct these deficiencies and increase overall smolt production from Butte Creek.

RECOMMENDATIONS: The proposed project will facilitate immediate design and 1997 construction of structures to improve fish passage at three critical Butte Creek problem locations. The specific corrective actions in the proposal include conducting feasibility/engineering activities at the high-priority fish passage sites (Adams, Gorrill, and Durham-Mutual Dams) and engineering state-of-the-art fish ladders at these sites. These actions have also been identified and discussed in DFG's 1993 report Restoring Central Valley Streams: A Plan for Action and USFWS' 1995 draft Anadromous Fish Restoration Plan. Refer to the summaries of these reports presented above for further discussion of goals and targets.

FUNDING: CVPIA, Category III, and Four Pumps Agreement funds

STATUS OF IMPLEMENTATION: In progress

RELATIONSHIP TO OTHER PLANS: Includes many goals and actions that were described in DFG's 1993 report Restoring Central Valley Streams: A Plan for Action and the USFWS' 1995 draft Anadromous Fish Restoration Plan.

PROJECT PROPOSAL FOR MERCED RIVER SALMON HABITAT ENHANCEMENT PROJECT DEVELOPMENT FROM RIVER MILES 40.0 TO 43.5

GEOGRAPHIC SCOPE: Merced River.

PURPOSE: Salmon spawning and rearing habitats have deteriorated significantly as a result of degraded channel geomorphology, low flows, poor water quality, high water temperatures, and predation on smolts by warmwater fish. The purpose of the proposed project is to develop preliminary engineering and feasibility analyses for restoration projects in five reaches of the Merced River between river miles 40.0 and 43.5. DFG records indicate that the site of the proposed project is within a very important natural chinook salmon spawning portion of the Merced River. This portion of the Merced River includes potential projects adjacent to the Robinson Ranch, Western Stone, and Ratzlaff Ranch properties.

RECOMMENDATIONS: The extent and variability of potential actions in this project include: levee removal and repair, levee relocation, revegetation, wetlands development, salmon habitat enhancement, channel reconfiguration, and channel realignment.

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED)

FISH POPULATIONS: Reduce potential for stranding emigrating juvenile fish, which can take place during pulsed outflow activities. Reduce straying potential for adult spawners in addition to downstream juvenile migrants. Permanently isolate a major source of juvenile salmon predation from the active river system.

HABITAT RESTORATION: Improve migration pathways for both juvenile and adult fish. Provide improved physical and biological streambed characteristics, which will lead to healthier and more stable riverine habitat conditions.

STRUCTURAL: No structural targets were identified.

FLOW-RELATED: No specific flow-related targets were identified.

JUSTIFICATION: DWR/DFG Four Pumps Agreement.

FUNDING: CVPIA, Category III, and Four Pumps Agreement Funds.

STATUS OF IMPLEMENTATION: In progress.

RELATIONSHIP TO OTHER PLANS: The project will integrate with and enhance other San Joaquin River projects, as described in the DFG June 1996 report A 30-Year Ecosystem Restoration Package for the San Joaquin River Drainage.

**RECOMMENDATIONS FOR THE RECOVERY OF THE SACRAMENTO RIVER WINTER-RUN CHINOOK SALMON. NATIONAL MARINE SERVICE, SOUTHWEST REGION.
MARCH 8, 1996**

GEOGRAPHIC SCOPE: Sacramento River.

PURPOSE: The purpose of the report is to provide recommendations on how to restore winter-run chinook salmon population to the Sacramento River.

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED)

FISH POPULATIONS:

The mean annual spawning abundance over 13 consecutive years shall be 10,000 females.

HABITAT RESTORATION:

Preserve and restore riparian habitat and meander belts along the Sacramento River and the Sacramento-San Joaquin Delta.

Develop and implement a Sacramento River and Delta Riparian Habitat Restoration and Management Plan.

Protect and maintain gravel resources in the Sacramento River and its tributaries between Keswick and Red Bluff.

Preserve and restore tidal marsh habitat.

Reduce pollution in the Sacramento River from Iron Mountain Mine.

Reduce pollution from industrial, municipal, and agricultural sources.

Reduce habitat loss, entrainment, and pollution from dredging and dredge disposal operations.

Provide suitable water quality in the Sacramento River watershed and the Sacramento-San Joaquin Delta, and the San Francisco Bay-Estuary.

STRUCTURAL:

Install temperature control device at Shasta Dam in conjunction with modifications to CVP operations.

Operate and maintain temperature control curtains as permanent installations in Whiskeytown and Lewiston Reservoirs; investigate installation of additional temperature curtain on the upstream side of Lewiston.

Modify Anderson Cottonwood Irrigation District (ACID) diversion dam.

FLOW-RELATED:

Maintain flows in the Sacramento River of 5,000 to 5,500 cfs from October through April.

Develop, implement, and monitor final instream flow recommendations and ramping rates for the upper Sacramento River.

JUSTIFICATION: Endangered Species Act.

CRITERIA: None.

FUNDING: None.

STATUS OF IMPLEMENTATION: NA.

RELATIONSHIP TO OTHER PLANS: National Marine Fisheries Services (NMFS) Biological Opinion for Sacramento River Winter-Run Chinook Salmon.

ABUNDANCE, DISTRIBUTION, AND HABITAT OF THE CENTRAL VALLEY POPULATION GREATER SANDHILL CRANES DURING WINTER

GEOGRAPHIC SCOPE : California's Central Valley

PURPOSE: To present and interpret data on the status and habitat of greater sandhill cranes within the Central Valley and Delta during winter.

RECOMMENDATIONS: The U.S. Fish and Wildlife Service and the California Department of Fish and Game (DFG) should develop specific plans to secure additional habitat dedicated to sandhill cranes. The creation of special crane conservation easements within important wintering areas, such as the Butte Sink and San Joaquin-Sacramento Delta, to guarantee the availability of adequate roosting and loafing habitats needs serious consideration.

FUNDING: None

STATUS OF IMPLEMENTATION: Submitted.

RELATIONSHIP TO OTHER PLANS: None

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340. (916)979-2113

SOURCE: Pogson, T.H., and S.M. Lindstedt. April 1988. Abundance, distribution and habitat of central valley population greater sandhill cranes during winter.

DISTRIBUTION, DENSITY, AND HABITAT REQUIREMENTS OF THE CALIFORNIA YELLOW-BILLED CUCKOO IN THE SACRAMENTO VALLEY

GEOGRAPHIC SCOPE: The Sacramento River from Tehama County south to Sutter County.

PURPOSE: To present data on the status and habitat of the Sacramento River population and review information concerning the past and present status and distribution of the yellow-billed cuckoo in California.

RECOMMENDATIONS: There are five recommendations described, which, if implemented, will help ensure continued survival of the California yellow-billed cuckoo in the Sacramento Valley:

- The west bank of Woodson Bridge State Park should be designated as an ecological reserve for the yellow-billed cuckoo.
- A statewide survey should be undertaken to determine the status of yellow-billed cuckoo in California.
- Habitat critical to the survival of the yellow-billed cuckoo should be designated and acquired as ecological reserves.
- Studies should be undertaken to determine conditions requisite to maintenance and enhancement of habitat including the preservation of backwater sloughs, oxbow lakes, etc.
- Evaluation should be conducted of all flood control and water projects affecting yellow-billed cuckoos.

FUNDING: None

STATUS OF IMPLEMENTATION: Submitted.

RELATIONSHIP TO OTHER PLANS: Unknown

CONTACT: California Department of Fish and Game, Environmental Services Division, 1416 Ninth Street, Sacramento, CA 95814

SOURCE: Gaines, David. 1974. Distribution, density and habitat requirements of the yellow-billed cuckoo in the Sacramento Valley: 1972-1973. Special Wildlife Investigations, California Department of Fish and Game. Project W-54-R6.

ECOLOGICAL STUDIES AND DEMOGRAPHIC MONITORING OF SOFT BIRD'S BEAK (*CORDYLANTHUS MOLLIS* SSP.*MOLLIS*)

GEOGRAPHIC SCOPE: San Pablo Bay to Suisun Bay in Contra Costa, Solano, and Napa Counties.

PURPOSE: Discuss the life cycle of *Cordylanthus mollis* ssp. *mollis* (COMOM), including germination, growth, and development, and natural or artificial parameters that may control population size and distribution.

RECOMMENDATIONS:

- Tidal marshes should be expanded and restored when possible.
- Habitat encroachment by construction activities within the drainage basins surrounding COMOM populations should be prevented when possible.
- A study to determine the salinity conditions under which COMOM seeds germinate should be conducted.
- Alternative forms of mosquito management, aside from mosquito ditches, should be pursued.

FUNDING: Contingent upon appropriations, priorities, and other budgetary constraints.

STATUS OF IMPLEMENTATION: Not implementable as a plan. This report provides information to those who wish to enhance particular habitats to increase the distribution of soft bird's beak.

RELATIONSHIP TO OTHER PLANS: Unknown

CONTACT: California Department of Fish and Game, Natural Heritage Division, 1416 Ninth Street, Sacramento, CA 95814.

SOURCE: Ruygt, Jake. 1994. Ecological studies and demographic monitoring of soft bird's beak (*Cordylanthus mollis* ssp. *mollis*), a California-listed rare plant species, and habitat management recommendations. California Department of Fish and Game, Natural Heritage Division. Sacramento, CA.

NONGAME MIGRATORY BIRD HABITAT CONSERVATION PLAN

GEOGRAPHIC SCOPE: National

PURPOSE: A component of a strategic plan entitled Fish and Wildlife 2000 to restore and enhance wildlife and its habitat on our nation's public lands.

RECOMMENDATIONS: There are six recommendations described in the management plan, which, if implemented, could enhance the probability of increasing nongame bird species populations in California:

- Determine status and trends of nongame bird species and their habitats on public land.
- Restore, maintain, and enhance populations of nongame bird species through habitat management.
- Conduct research and studies to obtain knowledge needed for informed decision making and management.
- Develop a broad awareness and understanding of the socioeconomic importance of nongame bird species and their value to our natural heritage.
- Build on existing relationships and develop new ones that foster conservation programs for nongame bird species.
- Develop relationships with Latin America and Canada that foster conservation programs for nongame bird species, especially neotropical migratory bird species.

FUNDING: The total cost for implementation of the strategy plan's first 5 years is estimated at \$52 million. No funding sources were documented.

STATUS OF IMPLEMENTATION: Implementation of all phases began in 1992 and continues based on delegated appropriations, priorities, and other budgetary constraints.

RELATIONSHIP TO OTHER PLANS: Any plan pertaining to the National Strategy Plan, Fish and Wildlife 2000.

CONTACT: U.S. Bureau of Land Management Public Affairs, 1849 C Street, N.W., Washington, DC 20240. (202) 208-5717.

SOURCE: U.S. Department of the Interior, Bureau of Land Management. Nongame migratory bird habitat conservation plan. Fish and Wildlife 2000.

SANDHILL CRANE RESEARCH AND MANAGEMENT - SPECIAL WILDLIFE INVESTIGATIONS

GEOGRAPHIC SCOPE: Northeastern California in Modoc and Lassen Counties.

PURPOSE: To conduct research and develop management plans to ensure the survival of sandhill crane breeding and wintering populations in California. A theoretical minimum of 12.0% recruitment is required to maintain crane population stability.

RECOMMENDATIONS: Habitat conditions may improve on both public and private lands simply by restricting grazing by livestock. Cranes avoid using pastures or meadows that are heavily grazed by cattle.

- Continue winter age-ratio counts of all populations of sandhill cranes wintering in California.
- Continue roost counts on wintering ground.
- Implement management programs designed to improve survivorship of young cranes on breeding grounds in California.
- Implement management programs to protect habitat on breeding and wintering ground.
- Coordinate efforts with other agencies to improve recruitment rates of all crane populations in the Pacific Flyway.
- Continue to enforce laws protecting sandhill cranes to reduce mortality on migration routes, wintering areas, and breeding grounds.
- Continue sandhill crane banding, color-marking, and radio-tagging studies to mark a large sample of greater sandhill cranes on breeding areas.
- Coordinate efforts with other agencies and researchers to accumulate information on cranes marked on wintering or breeding areas in the Pacific Flyway.

FUNDING: Not identified.

STATUS OF IMPLEMENTATION: Has been submitted.

RELATIONSHIP TO OTHER PLANS: None.

CONTACT: California Department of Fish and Game, Wildlife Management Division. Nongame Bird and Mammal Section, 1416 Ninth Street Sacramento, CA. (916)653-4094.

SOURCE: California Department of Fish and Game. 1986. Nongame wildlife investigations: sandhill crane research and management: July 1, 1985 - June 30, 1986. Sacramento, CA.

SHOREBIRD MANAGEMENT MANUAL

GEOGRAPHIC SCOPE: All existing and potential wetlands in North and South America.

PURPOSE: To provide wildlife managers with concise advice on how to manage habitats that benefit multiple species of shorebirds.

RECOMMENDATIONS: There are four recommendations described in the management plan, which, if implemented, could enhance the probability of increasing wetland acreage and shorebird populations in California:

- Preserve and protect remaining habitats from further development or degradation. Sites that host high densities of shorebirds during migration or wintering periods can be purchased or leased.
- Reduce disturbance for migrating, breeding, and wintering shorebirds in areas of high recreational use such as urban wetlands and coastal beaches.
- Enhance habitats for migrating and wintering shorebirds in freshwater and brackish wetlands, saltmarshes, mosquito control impoundments, and agricultural fields.
- As a high priority, restore habitat lost within the coastal and interior wetlands in the Pacific region. Tidal flats have been successfully restored to create foraging habitats for shorebirds and waterfowl.

FUNDING: Unknown.

STATUS OF IMPLEMENTATION: The Shorebird Management Manual has been published and reproduction of the manual is encouraged by Wetlands for the Americas.

RELATIONSHIP TO OTHER PLANS: Specifics of wetland restoration and creation not within this management plan have been summarized in various suggested readings in the conclusion.

CONTACT: Wetlands for the Americas, P.O. Box 1770, Manomet, MA 02345. (508) 224-6521.

SOURCE: Helmers, Douglas L. 1992. Shorebird Management Manual. Western Hemisphere Shorebird Reserve Network. Manomet, MA.

STAFF REPORT REGARDING MITIGATION FOR IMPACTS ON SWAINSON'S HAWKS IN THE CENTRAL VALLEY OF CALIFORNIA

GEOGRAPHIC SCOPE: California's great Central Valley

PURPOSE: To provide the Department of Fish and Game (DFG), California Environmental Quality Act (CEQA) lead agencies, and project proponents the context in which the Environmental Services Division (ESD) will review proposed project-specific mitigation measures.

RECOMMENDATIONS: There are four mitigation measures described in the plan that are adequate to meet the California Fish and Game Commission's and legislature's policy regarding listed species and are considered as preapproved for incorporation into any management authorizations for the Swainson's hawk issued by the DFG.

- No intensive new disturbances or other project-related activities that may cause nest abandonment or forced fledging should be initiated within 1/4 mile of an active nest between March 1 and September 15 or until August 15 if a management authorization or biological opinion is obtained for the project.
- Hacking, as a substitute for avoidance of impacts during the nesting period, may be used in unusual circumstances after review and approval of a hacking plan by ESD and Wildlife Management Division (WMD).
- To mitigate for the loss of foraging habitat, the management authorization holder/project sponsor shall provide habitat management (HM) lands to the DFG.
- Management authorization holders/project sponsors shall provide for the long-term management of HM lands by funding a management endowment at the rate of \$400 per HM land acre.

FUNDING: Unknown.

STATUS OF IMPLEMENTATION: Final draft approved.

RELATIONSHIP TO OTHER PLANS: None.

CONTACT: Mr. Ron Rempel, Program Supervisor, Habitat Conservation Planning and Endangered Species Permitting, Environmental Services Division. (916) 653-4875.

SOURCE: California Department of Fish and Game. 1994. Staff report regarding mitigation for impacts to Swainson's hawks (*Buteo swainsoni*) in the Central Valley of California. California Department of Fish and Game, Habitat Conservation Planning and Endangered Species Permitting, Environmental Services Division. Sacramento, CA.

**STATUS OF ACTIONS TO RESTORE CENTRAL VALLEY SPRING-RUN CHINOOK
SALMON - A SPECIAL REPORT TO THE FISH AND GAME COMMISSION.
FEBRUARY 1996**

GEOGRAPHIC SCOPE: Northern California streams.

PURPOSE: The purpose of the special report was to inform the Fish and Game Commission of the measures needed to restore and maintain spring-run chinook salmon populations in northern California streams.

RECOMMENDATIONS: This report provides a concise listing of the status of 166 habitat restoration projects, administrative actions, and evaluation studies that have been identified as necessary to protect, maintain, and restore spring-run chinook salmon populations in the Central Valley. Many of the recommendations for steelhead are linked to DFG's 1993 report Restoring Central Valley Streams and USFWS AFRP. Please refer to the goals in those reports for a complete discussion.

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED)

FISH POPULATIONS:

HABITAT RESTORATION:

STRUCTURAL:

FLOW-RELATED:

JUSTIFICATION: The plan was prepared in response to the potential listing of the spring-run salmon under the California and federal Endangered Species Acts.

CRITERIA: None.

FUNDING: None.

STATUS OF IMPLEMENTATION: NA.

RELATIONSHIP TO OTHER PLANS: None.

STATUS REVIEW OF THE RIPARIAN BRUSH RABBIT IN CALIFORNIA

GEOGRAPHIC SCOPE: Caswell Memorial State Park in southern San Joaquin County.

PURPOSE: To present and review data collected from a study conducted in response to a petition received by the California Fish and Game Commission to list the riparian brush rabbit (*Sylvilagus bachmani riparius*) as an endangered species.

RECOMMENDATIONS: There are 10 recommendations described in the status report, which, if implemented, could enhance the probability of increasing riparian brush rabbit populations along the San Joaquin River and its tributaries:

- List the riparian brush rabbit as endangered by the State of California.
- DFG should establish the interagency coordination and commitment necessary to halt the further loss and deterioration of riparian brush rabbit habitat and begin restoration and preservation of suitable habitat deemed essential to maintaining the subspecies in perpetuity.
- Identify, restore, and permanently preserve remaining and potential habitat areas within the floodplain of the San Joaquin River and its tributaries within the historical range of the riparian brush rabbit that are of a size sufficient to maintain self-sustaining populations.
- Establish at least five additional riparian brush rabbit populations after habitat restoration is accomplished.
- Conduct State, federal, local, and private land maintenance and management activities to minimize disturbance to riparian brush rabbits and their habitat and any other areas with potential for restoration between existing levees.
- Conduct a population viability analysis of the riparian brush rabbit to determine the breeding population levels and management actions necessary to ensure that each population will be healthy, viable, and able to naturally exist in perpetuity in the State.
- Establish a recovery planning team to develop a comprehensive management plan for riparian brush rabbits that is specific to the situation within the historic range and implement the plan.
- Once habitat is restored such that new populations can be introduced, modify the current hunting regulations for brush rabbits to preclude take of rabbits and hares within these local areas. After recovery occurs, remove hunting restrictions.

- Closely review planned development or any further disruption of remaining San Joaquin Valley riparian forest or other area within the floodplain between levees within the historic range of the riparian brush rabbit for presence or absence of any habitat suitable for restoration and possible reintroduction, prior to approval of such plans.
- Slightly modify habitat currently occupied by riparian brush rabbits at Caswell Memorial State Park to provide high ground with cover for protection from floods and construct additional fire breaks to protect habitat from destruction by wildfires. Modify flood levees adjacent to the park to allow for cover and protection of rabbits during floods.

FUNDING: Unknown.

STATUS OF IMPLEMENTATION: Has been submitted.

RELATIONSHIP TO OTHER PLANS: Unknown.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340. (916)979-2113.

SOURCE: Larsen, Caryla J. 1993. Report to the Fish and Game Commission : status review of the riparian brush rabbit (*Sylvilagus bachmani riparius*). Series title: Nongame Bird and Mammal Section report; 99-12. California Department of Fish and Game. California Nongame Bird and Mammal Section. Sacramento, CA.

STEELHEAD RESTORATION AND MANAGEMENT PLAN FOR CALIFORNIA. DFG, FEBRUARY 1996.

GEOGRAPHIC SCOPE: North Coast streams, Central Valley and South Coast region.

PURPOSE: The purpose of the plan is to ensure the maintenance, restoration, and enhancement of California's steelhead stock. The project is responsible for statewide coordination of DFG's steelhead management, research, and restoration activities. A high priority of the project is the development and implementation of the Steelhead Restoration and Management Plan. The document provides guidelines for steelhead restoration and management to be integrated into current and future planning processes for specific river and stream systems.

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED)

FISH POPULATIONS:

Conduct summer adult steelhead surveys.
Smith River - assess steelhead population, habitat, and fishery.

HABITAT RESTORATION:

Suction dredge mining should be discouraged in steelhead holding areas; require operating plans and performance bonds for all mining operations.
Locate habitat disturbances and potential fish barriers.
South Fork Trinity River - adopt best management practices such as deferring from harvest sensitive or unstable inner gorge slopes; implement 100-to-150-foot-wide stream management zones; selective harvest and special road location and construction techniques for timber stands that drain directly into steep, unstable inner gorge slopes; define, map and appropriately manage "sensitive lands"; timber harvest practices on private land should be reformed; increase efficiency of agricultural water use; perform a road inventory; implement riparian restoration for areas on Hayfork and tributaries damaged by grazing.
Redwood Creek - accelerate restoration activities in upper watershed; remove levees from within the estuary; study the effects of summer dams.
Eel River - Study the potential for chemically treating the upper Eel River drainage above Van Arsdale Reservoir should be investigated.

FLOW-RELATED:

Lower Klamath and mid-Klamath River - DFG should seek greater releases from Iron Gate Dam.
Scott and Shasta Rivers - DFG should seek improved flows for anadromous fish.

Trinity River - DFG should seek greater releases from Lewiston Dam to restore anadromous fish population and habitat; provide flushing flows and a release schedule to restore juvenile habitat.

FUNDING: Funding sources include Proposition 99 (Public Resources Account of the Cigarette and Tobacco Surtax Fund), California Wildlife, Coastal, and Park Land Conservation Fund of 1988, Steelhead Trout Catch Report-Restoration Card, Bosco-Keene Renewable Resources Investment Fund (RRIF), CVPIA restoration fund, Keen-Nielsen Fisheries Restoration Act account, and many others.

STATUS OF IMPLEMENTATION: NA

THE BUTTERFLY FAUNA OF THE UNIVERSITY OF CALIFORNIA AT DAVIS AND ENVIRONS

GEOGRAPHIC SCOPE: Putah Creek on the University of California (UC) Davis campus.

PURPOSE: To document a survey of the butterfly fauna of the Sacramento Valley, specifically the UC Davis campus and its environs.

RECOMMENDATIONS:

- If UC seeks to maintain a resident butterfly fauna within the main campus area, it will be necessary to conserve certain critical habitats, replace them if they must be altered, and/or develop additional new butterfly habitats.
- If it is desired that butterflies be retained or even enhanced as an element of the main campus landscape, deliberate provision must be made for them in the Long Range Development Plan (LRDP) in the form of breeding habitats.
- As an alternative or supplementary strategy, develop additional riparian or marshland habitat on campus, perhaps as part of the arboretum.

FUNDING: None.

STATUS OF IMPLEMENTATION: Final report has been submitted to Biosystems Analysis.

RELATIONSHIP TO OTHER PLANS: Unknown.

CONTACT: Biosystems Analysis Inc., Golden Gate Energy Center, Building 1065 Fort Cronkite, Sausalito, CA 94965.

SOURCE: Shapiro, Arthur M. 1987. The butterfly fauna of the University of California at Davis and environs; with recommendations for management and development. Prepared for Biosystems Analysis, Inc., Sausalito, CA.

THE STATUS OF THE SWAINSON'S HAWK IN CALIFORNIA

GEOGRAPHIC SCOPE: Statewide.

PURPOSE: To present and interpret data collected from a study conducted in response to directives in DFG's Plan for California Raptors (Mallette and Schlorff 1978). This plan lists the Swainson's hawk as a species needing immediate study to determine its status.

RECOMMENDATIONS: There are 11 recommendations described in the status report, which, if implemented, could enhance the probability of increasing Swainson's hawk populations in California:

- Include the Swainson's hawk on DFG's Endangered Species List.
- Include the Swainson's hawk on the U.S. Bureau of Land Management's Sensitive Species List.
- Conduct annual monitoring surveys to determine direction of population trends.
- Promote legislation for the protection of existing riparian zones (particularly in the Central Valley) and increase mitigation for current and past riparian losses.
- Determine wintering grounds and migration routes used by Swainson's hawks.
- Conduct pesticide analyses of Swainson's hawk eggs and tissues to determine if levels are high enough to cause reproductive failure or other problems.
- Increase public awareness concerning the importance of riparian zones and oak trees as wildlife habitat.
- Evaluate dense juniper woodlands on public lands in the great basin region of the State to determine the feasibility of returning this habitat to its original condition.
- Conduct a study in the Central Valley to determine the effects of crop conversions on Swainson's hawks and their prey.
- If necessary, provide economic incentives to farmers for the continued growing or expansion of crops that are beneficial to the Swainson's hawk and its prey.
- Plant cottonwood trees in spring developments on public lands in appropriate habitat.

FUNDING: Not identified.

STATUS OF IMPLEMENTATION: Has been submitted.

RELATIONSHIP TO OTHER PLANS: Associated with all other status reports conducted on raptors that inhabit California.

CONTACT: U.S. Department of the Interior, Bureau of Land Management, 2800 Cottage Way, Sacramento, CA 95825. 916\979-2800

SOURCE: Bloom, Peter H. 1979. The status of the Swainson's hawk in California, 1979. California Department of Fish and Game and U.S. Department of the Interior, Bureau of Land Management. Sacramento, CA.

RECOVERY PLANS

RECOVERY PLAN FOR THE ALEUTIAN CANADA GOOSE

GEOGRAPHIC SCOPE: Aleutian Islands, Alaska Peninsula, Coastal Oregon and the Central Valley of California.

PURPOSE: To attain an overall population greater than 7,500 geese, with at least 50 pairs nesting in each of the three remnant breeding areas. A total of from 25,000 to 35,000 acres of migration and wintering habitat must be secured and managed for Aleutian geese.

RECOMMENDATIONS: Five recommendations are described in the recovery plan's narrative, which, if implemented, would increase the chances of delisting the Aleutian Canada goose.

- Manage breeding habitat on three islands occupied by remnant breeders.
- Reintroduce geese to unoccupied historic breeding habitat.
- Secure and manage 25,000 to 35,000 acres of feeding and roosting habitat needed for migration and wintering.
- Protect geese from losses resulting from hunting, disease, and contamination.
- Conduct biological research and monitoring on Aleutian geese.

FUNDING: Contingent upon appropriations, priorities, and other budgetary constraints.

STATUS OF IMPLEMENTATION: Biological research is currently being conducted to learn more about reintroduction and protection of this species from disease, predation, and contamination. Public and private lands are currently being acquired and managed to attain the target acreage.

RELATIONSHIP TO OTHER PLANS: None.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340. (916)979-2113.

SOURCE: The Aleutian Canada Goose Recovery Team. 1982. Aleutian Canada goose recovery plan. Updated and revised. Denver, CO: U.S. Fish and Wildlife Service, Endangered Species Program. Portland, OR.

RECOVERY PLAN FOR THE AMERICAN PEREGRINE FALCON

GEOGRAPHIC SCOPE: California, Nevada, Oregon, and Washington.

PURPOSE: The number of known self-sustaining wild pairs required for consideration of delisting the peregrine falcon are: California, 120 pairs; Oregon, 30 pairs; Washington, 30 pairs; and Nevada, 5 pairs. The minimum productivity for this number of pairs should be an average of 1.5 fledged young per active territory per year over at least a 5-year period.

RECOMMENDATIONS: Five recommendations are described in the recovery plan's narrative, which, if implemented, would increase the chances of delisting the peregrine falcon:

- Provide adequate conditions to maintain all existing wild peregrine.
- Increase and maintain high wild productivity and decrease mortality.
- Establish successful peregrine pairs in suitable historic and potential nesting locations.
- Evaluate and update recovery program.
- Participate with other peregrine falcon recovery teams in developing education programs and international recovery measures, especially actions to curb the use of DDT in Latin American countries.

FUNDING: Contingent upon appropriations, priorities, and other budgetary constraints.

STATUS OF IMPLEMENTATION: Studies to better understand life history, breeding, foraging, and roosting ecology of peregrines are being conducted. Currently, wild populations are being manipulated to use optimum habitats and prevent disturbance at known nest sites and obtain nestlings for reintroduction by supporting captive breeding. Continue to study the effects of environmental pollutants, disturbance, shootings, transmission line collisions, disease, parasites, and predation.

RELATIONSHIP TO OTHER PLANS: None.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340. (916)979-2113

SOURCE: Pacific Coast American Peregrine Falcon Recovery Team. 1982. The Pacific Coast recovery plan for the American peregrine falcon. U.S. Fish and Wildlife Service, Endangered Species Program, Portland, OR.

RECOVERY PLAN FOR THE BALD EAGLE

GEOGRAPHIC SCOPE: Pacific Coast

PURPOSE: To produce a minimum of 800 nesting pairs in the Pacific recovery area with an average reproductive rate of 1.0 fledged young per pair and an average success rate of not less than 65%. To attain breeding population goals in at least 80% of the management zones with nesting potential and stable or increasing wintering populations.

RECOMMENDATIONS: Four recommendations are described in the recovery plan's narrative, which, if implemented, would increase the chances of delisting the bald eagle:

- Provide secure habitat.
- Inventory, monitor, and research bald eagle habitat and populations to obtain adequate knowledge for developing and evaluating management programs.
- Develop and maintain public awareness and law enforcement programs.
- Augment bald eagle population levels through management and protection.

FUNDING: Contingent upon appropriations, priorities, and other budgetary constraints.

STATUS OF IMPLEMENTATION: Scientific studies are ongoing to document nest, forage, and migration areas, as well as to incorporate habitat guidelines and assess suitability of habitat not currently occupied. Habitat is currently being acquired through management areas, land purchases, and cooperative agreements. Inland and anadromous fish populations are managed to maintain and enhance adequate food supply. Human disturbance is restricted at bald eagle use areas.

RELATIONSHIP TO OTHER PLANS: None.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340. (916)979-2113.

SOURCE: Pacific States Bald Eagle Recovery Team. 1986. Pacific bald eagle recovery plan. U.S. Fish and Wildlife Service. Portland, OR.

RECOVERY PLAN FOR THE DELTA GREEN GROUND BEETLE AND SOLANO GRASS

GEOGRAPHIC SCOPE: Jepson Prairie near Dixon, California.

PURPOSE: To establish and secure three additional viable and self-sustaining colonies of the Delta green ground beetle and maintain the existing population for 10 years. Additionally, the same criteria must be met for Solano grass for 15 years.

RECOMMENDATIONS: There are six recommendations described in the recovery plan's narrative, which, if implemented, would increase the chances of delisting the Delta green ground beetle and Solano grass:

- Use laws, regulations, and plans to protect Solano grass and Delta green ground beetles.
- Enhance existing habitat and minimize mortality of Delta green ground beetles.
- Establish additional colonies of Delta green ground beetles in the Jepson Prairie region.
- Enhance existing habitat and maximize productivity of Solano grass.
- Establish additional populations of Solano grass in the Jepson Prairie region.
- Increase public awareness of the Delta green ground beetle and Solano grass and their habitat.

FUNDING: Contingent upon appropriations, priorities, and other budgetary constraints.

STATUS OF IMPLEMENTATION: Assess, revise, and enforce applicable laws and regulations designed to protect the Delta green ground beetle and Solano grass. Studies continue to examine human impacts, introduction possibilities, habitat requirements, management strategies, mortality factors, and the relationships between the two species. Educational programs being provided to schools as funding allows.

RELATIONSHIP TO OTHER PLANS: None.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340. (916)979-2113.

SOURCE: U.S. Fish and Wildlife Service. 1985. Delta green ground beetle (*Elaphrus viridis*) and Solano grass (*Tuctoria mucronata*) recovery plan. U.S. Fish and Wildlife Service, Portland, OR.

RECOVERY PLAN FOR THE SACRAMENTO-SAN JOAQUIN DELTA NATIVE FISHES. USFWS TECHNICAL/AGENCY DRAFT, DECEMBER 8, 1994

GEOGRAPHIC SCOPE: San Francisco Bay and Delta

PURPOSE: This recovery plan for native fishes is intended to provide a means for the conservation of ecosystems on which endangered and threatened species depend. The basic objective of the recovery plan is to establish self-sustaining populations of the species of concern that will persist indefinitely. The purpose of the recovery plan is to outline a strategy for the conservation and restoration of the Sacramento-San Joaquin Delta that currently supports or has the potential to support Delta native fishes. Eight species of concern are included in the recovery plan: Delta smelt, longfin smelt, Sacramento splittail, green sturgeon, Sacramento spring-run chinook salmon, Sacramento late fall-run chinook salmon, San Joaquin fall-run chinook salmon, and Sacramento perch.

RECOMMENDATIONS: The recovery plan goals include delisting of the delta smelt and splittail and restoration of longfin smelt; green sturgeon; spring-run, late fall-run, and San Joaquin fall-run chinook salmon. The plan includes quantifiable and specific criteria to: 1) monitor effectiveness of recovery actions, 2) determine when a species has recovered to a secure level (stabilized), and 3) determine when a species qualifies for delisting. The focus is on reestablishing identified population abundance and distribution levels. For each species, a historic base period was established using data to characterize abundance and distribution during a predecline period. The time period over which abundance and distribution criteria must be met was five generations. For five of the species, there is an additional requirement of meeting the criteria over a minimum number of years of stressful environmental conditions.

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED)

FISH POPULATIONS: Individual species' abundance and distribution levels were described and set using data from a selected reference period and geographic area. Reference data were presented in tables and graphics for each species of concern. Other actions related to fish population targets included reducing the effects of introduced aquatic species on Delta native fishes, reducing the effects of harvest, and conducting monitoring and research on fish biology and management requirements.

HABITAT RESTORATION: Improve in-Delta and downstream-of-Delta habitat conditions, reduce entrainment losses to water diversions, reduce the effects of dredging and contaminants, and develop shallow-water habitat, riparian vegetation zones, and tidal marsh within the Delta.

STRUCTURAL: Screen diversions at the CCWD Rock Slough intake.

FLOW-RELATED: Flow-related targets were described in the recovery plan as part of habitat restoration actions. These actions focus primarily on reoperation of CVP and SWP facilities and increasing freshwater inflows and changing Delta outflows to improve the quality and availability of habitat.

JUSTIFICATION: Federal Endangered Species Act

FUNDING: None identified.

STATUS OF IMPLEMENTATION: NA

RELATIONSHIP TO OTHER PLANS: The recovery plan incorporates and describes the goals and actions of many other Bay-Delta programs, including the CVP, SWP, and other restoration plans for the Sacramento and San Joaquin Rivers.

RECOVERY PLAN FOR THE SALT MARSH HARVEST MOUSE AND CALIFORNIA CLAPPER RAIL

GEOGRAPHIC SCOPE: San Francisco Bay complex.

PURPOSE: To protect and enhance existing marshes, restore historical habitat, and show the need for additional research on their habitat requirements and population trends, especially in San Pablo Bay and the Suisun Marsh.

RECOMMENDATIONS: There are five steps recommended to carry out this recovery plan:

- Selected existing marshes must be protected, including those necessary to reduce intermarsh distances. Where possible, marshes should be connected and combined to make the average protected areas larger. Larger marshes generally will support larger and possibly multiple populations of each species and, therefore, will increase the chances of survival.
- New habitat must be created, including areas rich in pickleweed for the mouse, and areas with unrestricted tidal circulation (e.g., tidal sloughs); healthy invertebrate populations; and suitable nesting habitat for the rail. Considering the numerous declining trends in habitat quality, current evident population declines, and the widespread lack of higher elevation marsh habitat throughout the range of both species, the continued existence, as well as recovery, of the mouse and rail depend not only on protection of existing habitat, but also on extensive restoration of former habitat (diked historic baylands).
- The upper portions of marshes must be restored to provide refugia for both species during high tides, as well as nesting habitat for the mouse and rail in those marshes that have undergone subsidence and subsequent vegetation change.
- Additional biological research must be undertaken to assist in recovering both species. Studies are needed on the effects of treated sewage effluents, pollution, flood control, mosquito abatement, waterfowl management practices on water salinities, marsh floristics, and habitat suitability for the mouse and rail. Studies are also needed on the long-term effects of sea-level rise, reduced sediment input into the Bay, marsh erosion, and accretion trends on mouse and rail habitat.
- Ongoing management will be necessary on all marshes preserved for the mouse and rail.

FUNDING: California State Coastal Conservancy; DFG; Cities of Mountain View, San Jose, Sunnyvale, Palo Alto, and San Leandro; U.S. Army Corps of Engineers; California Department of Parks and Recreation; East Bay Regional Park District; U.S. Fish and Wildlife Service; Pacific Gas & Electric; The Nature Conservancy; and Bay Conservation and Development Commission.

STATUS OF IMPLEMENTATION: Initiation is subject to the availability of funds within each agency required to participate.

RELATIONSHIP TO OTHER PLANS: Unknown.

CONTACT: U.S. Fish and Wildlife Service, Portland, Oregon.

SOURCE: U.S. Fish and Wildlife Service. 1984. Salt marsh harvest mouse and California clapper rail recovery plan. U.S. Fish and Wildlife Service, Portland, OR.

RECOVERY PLAN FOR THE SAN JOAQUIN KIT FOX

GEOGRAPHIC SCOPE: Central Valley of California.

PURPOSE: The ultimate objective of the recovery plan is to delist the San Joaquin kit fox; however, at the time the plan was written it was not known what population levels and degree of habitat protection were necessary to satisfy criteria for delisting. Appropriate research was proposed as a high-priority task to provide this information.

RECOMMENDATIONS: Propose interim objectives of halting the decline of the San Joaquin kit fox and increasing population sizes above 1981 levels, justifying a change in status from endangered to threatened. To achieve the interim objectives, it is recommended that:

- 35,000 acres of kit fox habitat be protected in Zone 1;
- protection of the kit fox and its habitat in Zones 1,2, and 3 be provided; and
- the fox be managed to provide at least 1.4 adult kit fox per square mile on privately owned and public lands.

FUNDING: None identified.

STATUS OF IMPLEMENTATION: The Department of Energy is sponsoring continuing studies on the impacts of Elk Hills petroleum activities on the kit fox.

RELATIONSHIP TO OTHER PLANS: None.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 2800 Cottage Way, Room E-1803, Sacramento, California 95825. (916) 978-4610.

SOURCE: U.S. Fish and Wildlife Service. 1983. San Joaquin kit fox recovery plan. U.S. Fish and Wildlife Service, Portland, OR.

RECOVERY PLAN FOR THREE ENDANGERED SPECIES ENDEMIC TO ANTIOCH DUNES, CALIFORNIA

GEOGRAPHIC SCOPE: Antioch Dunes, CA.

PURPOSE: To prevent the further loss of the Lange's metalmark butterfly (LMB), Contra Costa wallflower (CCW), and Antioch Dunes evening primrose (ADEP); to protect introduced populations and their habitats; and to determine the number of populations that are necessary to reclassify each species to threatened and to delist.

RECOMMENDATIONS: There are three recommendations described in the recovery plan's narrative, which, if implemented, would increase the chances of delisting the Lange's metalmark butterfly, Contra Costa wallflower, and Antioch Dunes evening primrose:

- Protect Antioch Dunes ecosystem and essential habitat for LMB, CCW, ADEP.
- Restore Antioch Dunes ecosystem and increase numbers and improve habitat for LMB, CCW, ADEP.
- Initiate information and education program.

FUNDING: Contingent upon appropriations, priorities, and other budgetary constraints.

STATUS OF IMPLEMENTATION: Management plan implemented to protect refuge lands and annual surveys to determine status of and threats to LMB, CCW, and ADEP. Removal of exotic vegetation when time and money allows. Information leaflets being developed and distributed.

RELATIONSHIP TO OTHER PLANS: Unknown.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340. (916)979-2113.

SOURCE: U.S. Fish and Wildlife Service. 1984. Revised recovery plan for three endangered species endemic to Antioch Dunes, California: Lange's metalmark butterfly, Contra Costa wallflower, and Antioch Dunes evening primrose. Approved March 21, 1980 and revised April 25, 1984. U.S. Fish and Wildlife Service, Endangered Species Program. Portland, OR.

RECOVERY PLAN FOR THE VALLEY ELDERBERRY LONGHORN BEETLE

GEOGRAPHIC SCOPE: Central Valley of California, particularly the Merced and American Rivers.

PURPOSE: To preserve the three known sites as well as potential habitat sites. The point or condition when this species can be considered recovered has not yet been determined.

RECOMMENDATIONS: There are seven recommendations described in the recovery plan's narrative, which, if implemented, would increase the chances of delisting the valley elderberry longhorn beetle (VELB):

- Preserve and protect known habitat sites to provide adequate conditions for VELB.
- Survey riparian forests of the Sacramento and San Joaquin Valleys for presence of VELB and incorporate findings into short- and long-term management programs.
- Determine ecological requirements and management needs of VELB.
- Preserve and protect newly discovered VELB habitat to provide suitable conditions for the species.
- Reestablish VELB at rehabilitated habitat sites within the presumed historical range in the Sacramento and San Joaquin Valleys.
- Increase public awareness of VELB through education and information programs.
- Enforce laws and regulations to protect VELB.

FUNDING: Contingent upon appropriations, priorities, and other budgetary constraints.

STATUS OF IMPLEMENTATION: The two American River sites and the Merced River site are currently being protected and surveys to locate other VELB populations are being conducted. Studies to determine life history and habitat requirements are also continuing. Laws and regulations to protect VELB are ongoing.

RELATIONSHIP TO OTHER PLANS: None.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340. (916)979-2113.

SOURCE: U.S. Fish and Wildlife Service. 1984. Valley elderberry longhorn beetle recovery plan. U.S. Fish and Wildlife Service, Endangered Species Program. Portland, OR.

RESTORATION AND RECOVERY OF MASON'S LILAEOPSIS: PHASE II

GEOGRAPHIC SCOPE: Littoral zones of the Sacramento-San Joaquin Delta, Suisun Marsh, and Napa River.

PURPOSE: To outline work accomplished by researchers at San Francisco State University during Phase II of the restoration and recovery of *Lilaeopsis masonii*. This work is in response to the Shell Oil Refinery spill at Martinez, California in 1988.

RECOMMENDATIONS: Because *Lilaeopsis masonii* is one of the most widespread State-listed species, as evidenced by the large number of populations not documented, it does not appear to currently require additional protection. It is urged that this evaluation be tempered by the observations summarized below:

- If levels of salinity in the San Francisco Estuary and Sacramento-San Joaquin Delta increase significantly as a result of water diversion, the viability and geographic integrity of this species will most likely be compromised.
- Effects of crude oil on the above-ground growth of *Lilaeopsis* has been demonstrated to be significantly detrimental.
- Invasion of non-native species, particularly the water hyacinth (*Eichornia crassipes*), is a serious threat to the health and viability of populations of *Lilaeopsis*, particularly in the central Delta.
- This species is also susceptible to habitat loss from the effects of boat wakes, foot traffic, and by the natural slumping of the littoral zone.

FUNDING: Shell Oil agreed to pay \$19,750,000.00 to the California Department of Justice, a portion of which was allocated to the preservation of California plants, wildlife, fisheries, land acquisition, land improvements, and species propagation projects, including the restoration and recovery of *Lilaeopsis masonii*.

STATUS OF IMPLEMENTATION: This is a final report submitted to DFG and the Shell Oil Spill Litigation Settlement Trustee Committee. The report did not outline an implementation program.

RELATIONSHIP TO OTHER PLANS: This report is a sequel to Initial Assessment of Impacts to Rare Plant Communities from the Shell Oil Refinery Spill at Martinez, California (Showers 1988). The initial assessment was submitted to the Nongame Heritage Division of DFG.

CONTACT: California Department of Fish and Game, Plant Heritage Program, 1416 Ninth Street, P.O. Box 94409, Sacramento, CA 95814-2090. (916) 324-3814.

SOURCE: Zebell, R.K., and P.L. Fiedler. 1996. Restoration and recovery of Mason's lilaeopsis, Phase II: final report. Submitted to Shell Oil Litigation Settlement Trustee Committee and California Department of Fish and Game, Plant Heritage Program, Sacramento, CA.

HABITAT MANAGEMENT PLANS

A GUIDE TO WATERFOWL HABITAT MANAGEMENT IN SUISUN MARSH

GEOGRAPHIC SCOPE: Suisun Marsh, California.

PURPOSE: To maximize waterfowl food production while maintaining a diverse marsh flora capable of supporting the present wide variety of animal life.

RECOMMENDATIONS: The four types of management described are the result of many years of research and applied marsh management. Waterfowl food production can be improved in virtually every area of the marsh through the proper application of one or more of the following techniques.

- Manage alkali bulrush as a particularly useful plant on which to base current and future practices.
- Manage fat-hen, an upland annual plant that produces large quantities for seeds that are highly sought after by most species of ducks in the Suisun Marsh.
- Manage permanent and seasonal ponds.
- Continue barley cultivation as the most common agricultural crop planted in the Suisun Marsh for waterfowl use.

FUNDING: Collaborative funding by the Department of Fish and Game, the Department of Water Resources, and the Bureau of Reclamation.

STATUS OF IMPLEMENTATION: Much of this management plan has been or is currently being implemented or modified to enhance waterfowl use of the Suisun Marsh.

RELATIONSHIP TO OTHER PLANS: This report has been included as an integral part of the Suisun Marsh Management Plan prepared by the Suisun Resource Conservation District as mandated by Assembly Bill 1717 and the Suisun Marsh Preservation Act of 1977.

CONTACT: California Department of Fish and Game, Environmental Services Division, 1416 Ninth Street, Sacramento, CA. 95814. (916) 653-4875.

SOURCE: Rollins, Glenn L. 1981. A guide to waterfowl habitat management in Suisun Marsh. State of California, The Resources Agency, California Department of Fish and Game. Sacramento, CA.

A MANAGEMENT PLAN FOR AGRICULTURAL SUBSURFACE DRAINAGE AND RELATED PROBLEMS ON THE WESTSIDE SAN JOAQUIN VALLEY

GEOGRAPHIC SCOPE: Westside San Joaquin Valley.

PURPOSE: To submit a framework that will permit the present level of agricultural development in the valley to continue while protecting fish and wildlife and helping to restore their habitat to that existing before direct impact by contaminated drainage water.

RECOMMENDATIONS: Actions are required on many fronts to make the plan a reality. These actions can be grouped under *planning, implementation, monitoring, additional study, and funding proposed* actions. The recommendations for those actions are presented in each of the groups.

FUNDING: The annual costs of the recommended plan is approximately \$42,000. All funding sources are not identified, although the sale of quality water and restored land is a possibility.

STATUS OF IMPLEMENTATION: Several components in the management plan are either being studied prior to action or are actually being carried out by organizations and private interests in the problem area. A federal-State effort between October 1990 and December 1991 will develop a strategy for implementation of the plan.

RELATIONSHIP TO OTHER PLANS: This management plan provides recommendations based on data analyses of salt intrusion and agricultural practices of the San Joaquin Valley. Various reports on water drainage problems are cited in the "References Cited" section of this report.

CONTACT: California Resources Agency, 1416 Ninth Street, Sacramento, CA 95814.

SOURCE: U.S. Department of the Interior - U.S. Bureau of Reclamation, Fish and Wildlife Service, Geological Survey; California Resources Agency - Department of Fish & Game, Department of Water Resources. September 1990. A management plan for agricultural subsurface drainage and related problems on the westside San Joaquin Valley. Final report of the San Joaquin Valley drainage program.

A PLANNER'S GUIDE TO OAK WOODLAND

GEOGRAPHIC SCOPE: Statewide.

PURPOSE: To present the value, biology, and planning options of the various oak species and the habitats where they are encountered. Submit recommendations on how to maximize wildlife utilization within oak woodlands and reduce disturbance.

RECOMMENDATIONS: Five recommendations are described in the management plan's chapter on oak woodland wildlife, which, if implemented, would increase wildlife diversity and decrease ecological stressors in oak woodland habitats.

- Maintain as many large, open-space elements as possible. Large patches of woodland provide a variety of habitat elements and species.
- Maintain large habitat fragments at least for vertebrate animals, to several smaller fragments.
- To the extent possible, retain large carnivores in the natural system. There is compelling evidence that coyotes, bobcats, and mountain lions limit numbers of smaller predators, such as foxes and domestic cats, that prey on ground-nesting birds.
- Minimize human disturbance.
- Maintain or develop corridors to link habitat parcels. Corridors frequently lessen the deleterious effects of habitat fragmentation by providing passageways between fragments.

FUNDING: Not identified.

STATUS OF IMPLEMENTATION: This guide is not designed to be implemented as one project; rather, it provides information to agencies and private groups seeking recommendations for individual projects on a site-by-site basis.

RELATIONSHIP TO OTHER PLANS: None.

CONTACT: California Department of Forestry and Fire Protection or the University of California at Berkeley.

SOURCE: Guisti, G.A. and P.J. Tinnin (eds.). 1993. A planner's guide for oak woodlands. Publication of the Integrated Hardwood Range Management Program, Department of Forestry and Resource Management, University of California, Berkeley, CA.

ANADROMOUS FISH RESTORATION PLAN (AFRP)
A PLAN TO INCREASE NATURAL PRODUCTION OF ANADROMOUS FISH IN THE
CENTRAL VALLEY OF CALIFORNIA
DECEMBER 6, 1995

GEOGRAPHIC SCOPE: Central Valley.

PURPOSE: The purpose of AFRP is to fulfill the goals established in Central Valley Project Improvement Act (CVPIA), which directs the Secretary of the Interior to develop and implement a program that makes all reasonable efforts to ensure that, by 2002, natural production of anadromous fish in the Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained from 1967 to 1991. The restoration plan provides a list of actions considered by U.S. Fish and Wildlife Service (USFWS) to be reasonable and identifies those that are underway or likely to be implemented in 1996. The plan also includes a process to implement actions.

RECOMMENDATIONS: AFRP contains many population, habitat, structural, and flow targets and goals for specific watersheds. One hundred seventy-six actions and 109 evaluations were identified in AFRP and are summarized in Table 1. The legislative actions, as described in CVPIA, are summarized in the following four categories. Specific actions on each stream are provided in Appendix A.

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED)

FISH POPULATIONS:

Table 2, excerpted from AFRP, includes target production levels for anadromous fish in Central Valley rivers and streams.

Table 3, excerpted from AFRP, provides production targets for chinook salmon in each stream.

Mitigate for Tracy Pumping Plant operations.

Mitigate for Contra Costa Pumping Plant operations.

HABITAT RESTORATION:

Replenish spawning gravels and restore riparian habitat below Shasta, Folsom, and New Melones Reservoirs.

STRUCTURAL:

Install temperature control device at Shasta Dam.

Implement Coleman National Fish Hatchery Plan and modify Keswick Dam Fish Trap.

Install new control structures at the Delta Cross Channel and Georgiana Slough.

Construct, in cooperation with the State and in consultation with local interests, a seasonally operated barrier at the head of Old River.
Resolve fish passage and stranding problems at ACID diversion dam.
Assist State in efforts to avoid losses of juvenile anadromous fish resulting from unscreened or inadequately screened diversions.
Minimize fish passage problems at Red Bluff diversion dam.

FLOW-RELATED:

Acquire water to supplement the quantity of water dedicated for fish and wildlife water needs under CVPIA sections 3406(b)(2) and 3406(b)(3).
Meet flow standards that apply to the Central Valley Project (CVP).
Use pulse flows to increase migratory fish survival.
Eliminate fish losses from flow fluctuations of the CVP.
Provide increased flows and improve fish passage and restore habitat in Clear Creek.
Reevaluate carryover storage criteria for reservoirs on the Sacramento and Trinity Rivers.

JUSTIFICATION: Central Valley Project Improvement Act.

CRITERIA: None.

FUNDING: CVPIA.

STATUS OF IMPLEMENTATION: In progress.

RELATIONSHIP TO OTHER PLANS: Includes some of the goals and actions in California Department of Fish and Game's (DFG's) Restoring Central Valley Streams A Plan for Action.

MAPS/TABLES: See Tables 1-3.

ANADROMOUS FISH RESTORATION PROGRAM PLAN (DRAFT)

GEOGRAPHIC SCOPE: Central Valley.

PURPOSE: The Anadromous Fish Restoration Program Plan (AFRP) was developed to satisfy the direction by the Secretary of Interior "to develop and implement a program which makes all reasonable efforts to ensure that, by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991".

RECOMMENDATIONS: Six objectives were outlined as important to achieving the above purpose. Only the terrestrial objectives are discussed below.

Targets/Objectives: 1) Improve stream habitat for all life stages of anadromous fish through improved flows, water quality, and physical structure; and 2) integrate habitat restoration efforts with harvest and hatchery management. Specific terrestrial actions identified under these objectives are:

- Fence select riparian corridors within the Cow Creek watershed to exclude livestock.
- Maintain and restore the riparian habitat along the lower reaches of Mill Creek.
- Employ the most ecologically sound timber extraction practices by implementing the forest plan on federal lands within the Thomas Creek drainage.
- Modify and employ the most ecologically sound grazing practices by implementing the forest plan on federal lands within the Thomas Creek drainage.
- Negotiate long-term agreements to maintain and restore riparian habitats along the lower reaches of Deer Creek.
- Cooperate with local landowners to encourage revegetation of denuded stream reaches and establish a protected riparian strip.
- Develop a watershed management program for the Butte Creek drainage.
- Develop a riparian corridor management plan to improve and protect riparian habitat and instream cover for the American River.
- Enhance and maintain the riparian corridor to improve streambank and channel rearing habitat for juvenile salmonids in the Mokelumne River.
- Establish a riparian corridor protection zone for the Consumes River.

- Improve watershed management to restore and protect instream and riparian habitat including consideration of restoring and replenishing spawning gravel in the Merced and Tuolumne Rivers.
- Improve watershed management to restore and protect instream and riparian habitat in the Stanislaus River.
- Evaluate riparian restoration opportunities, such as conservation easements, that are coordinated with restoration of rearing habitats and consistent with flood control and other objectives in the mainstem of the San Joaquin River.
- Evaluate land retirement as a means of improving water quality and riparian and rearing habitats and reducing the number of diversions in the Delta.
- Evaluate opportunities to develop channel buffer zones to enhance riparian areas and reduce sedimentation in the San Joaquin River mainstem.

STATUS OF IMPLEMENTATION: None of the above actions were identified as having a high potential for implementation prior to the end of fiscal year 1996. Several of the actions are addressed by the upper Sacramento River Riparian Habitat Committee.

RELATIONSHIP TO OTHER PLANS: None.

SOURCE: U.S. Fish and Wildlife Service. Draft Anadromous Fish Restoration Plan. 1995. A plan to increase natural production of anadromous fish in the Central Valley of California. December 6, 1995.

AREAS OF CRITICAL CONCERN AND PROPOSALS FOR THEIR PROTECTION

GEOGRAPHIC SCOPE: Central Sacramento Valley area and foothills.

PURPOSE: To inform resource agencies, industry, special-interest groups, and the general public of significant natural areas and critical wildlife habitats in the Sacramento Valley region. By identifying these critical areas, the information contained in the publication can also work to unite conservation and similar organizations to combine efforts to protect significant areas and to reduce the need for adversarial campaigns for the protection of significant areas.

RECOMMENDATIONS: Provide increased protection of the identified areas of concern to maintain or enhance their viability in the wake of changing land uses and development pressures.

FUNDING: Sacramento Audubon Society.

STATUS OF IMPLEMENTATION: To be used as a guideline for any future projects that may occur within any areas listed in the report.

RELATIONSHIP TO OTHER PLANS: Unknown.

CONTACT: Sacramento Audubon Society, 3615 Auburn Boulevard, Sacramento, California 95821.
(916) 485-4471.

SOURCE: Sacramento Audubon Society. 1989. Sacramento Audubon Society areas of critical concern and proposals for their protection, natural areas and wildlife habitat. Sacramento Audubon Society. 1st rev. Sacramento, CA.

BAY-DELTA OVERSITE COUNCIL (COUNCIL): PLANT AND WILDLIFE RESOURCES TECHNICAL ADVISORY COMMITTEE

GEOGRAPHICAL SCOPE: The San Francisco Bay and the Sacramento-San Joaquin Delta.

PURPOSE: Eight individuals of various environmental disciplines and agencies were appointed by the Bay-Delta Oversight Committee (BDOC) to the Plant and Wildlife Resources Technical Advisory Committee (TAC). The committee includes technical experts in the fields of wildlife preserve planning and implementation, botany, waterfowl management, and estuarine ecosystem management. TAC's mission is to identify potential action options to achieve the Council's objective for improving the estuary's plant and wildlife resources. TAC was also charged with developing evaluation criteria to measure the reflective effectiveness of the action options. This document represents the first draft of work products to serve the initial phase of the BDOC process and consists of:

- completing an outline of an initial, comprehensive approach to improving the estuary's plant and wildlife resources,
- developing action options focused on improving conditions in the estuary for plant and wildlife resources,
- developing an evaluation matrix to assist in measuring the effectiveness of implementing action options,
- developing a list of habitat types and associated key plants and wildlife species, and
- developing a draft wildlife planning guide for Delta levees.

RECOMMENDATIONS: The objectives established by the Council for biological resources are as follows:

GENERAL OBJECTIVES:

- Improve and sustain biological resources dependent on the estuarine ecosystem.

SPECIFIC OBJECTIVES:

- Improve conditions in the Estuary in order to avoid, eliminate, or offset adverse effects on fishery resources caused by water development and other effects.
- Preserve, restore, or, where those are not possible, simulate an ecosystem that provides for the integrity of biological resources as defined by composition, structure, and function.

- Improve and sustain habitats and natural communities which support the Estuary's native wildlife and plant resources.

FUNDING: N/A

STATUS OF IMPLEMENTATION: N/A

RELATION TO OTHER PLAN: None

CONTACT: Frank Wernette, Chairman of TAC and Senior Biologist, Department of Fish and Game.

SOURCE: Bay-Delta Oversight Council, Initial Report on Work Completed by the Plant and Wildlife Resources Technical Advisory Committee: Draft. 1994.

**BIOLOGICAL STUDY - NONINDIGENOUS AQUATIC SPECIES IN A UNITED STATES
ESTUARY: A CASE STUDY OF THE BIOLOGICAL INVASIONS OF THE SAN
FRANCISCO BAY AND DELTA**

GEOGRAPHIC SCOPE: San Francisco Bay and Delta.

PURPOSE: The focus of the study was to evaluate the effects of non-native aquatic species on the ecological health of the San Francisco Bay and Delta.

RECOMMENDATIONS: The primary recommendations are for further research into certain areas to increase our understanding of these invasions to the bay ecology: experimental ecology of invasions, regional shipping study, intraregional human-mediated dispersal vectors, study of the baitworm and lobster shipping industries, molecular genetics of invaders, increased utilization of non-native species, zebra mussel invasion studies; economic impacts of wood borers and fouling organisms: economic, ecological and geological impacts of bioeroding nonindigenous species and postinvasion control mechanisms.

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED) No specific fish population, habitat restoration, structural or flow-related targets were identified in the report.

HABITAT RESTORATION: None.

STRUCTURAL: None.

FLOW-RELATED: None.

JUSTIFICATION: None.

CRITERIA: None.

FUNDING: The National Sea Grant College Program, Connecticut Sea Grant (NOAA Grant Number NA36RG047).

STATUS OF IMPLEMENTATION: NA.

RELATIONSHIP TO OTHER PLANS: None.

CENTRAL VALLEY HABITAT JOINT VENTURE IMPLEMENTATION PLAN

GEOGRAPHIC SCOPE: California's Central Valley and Delta.

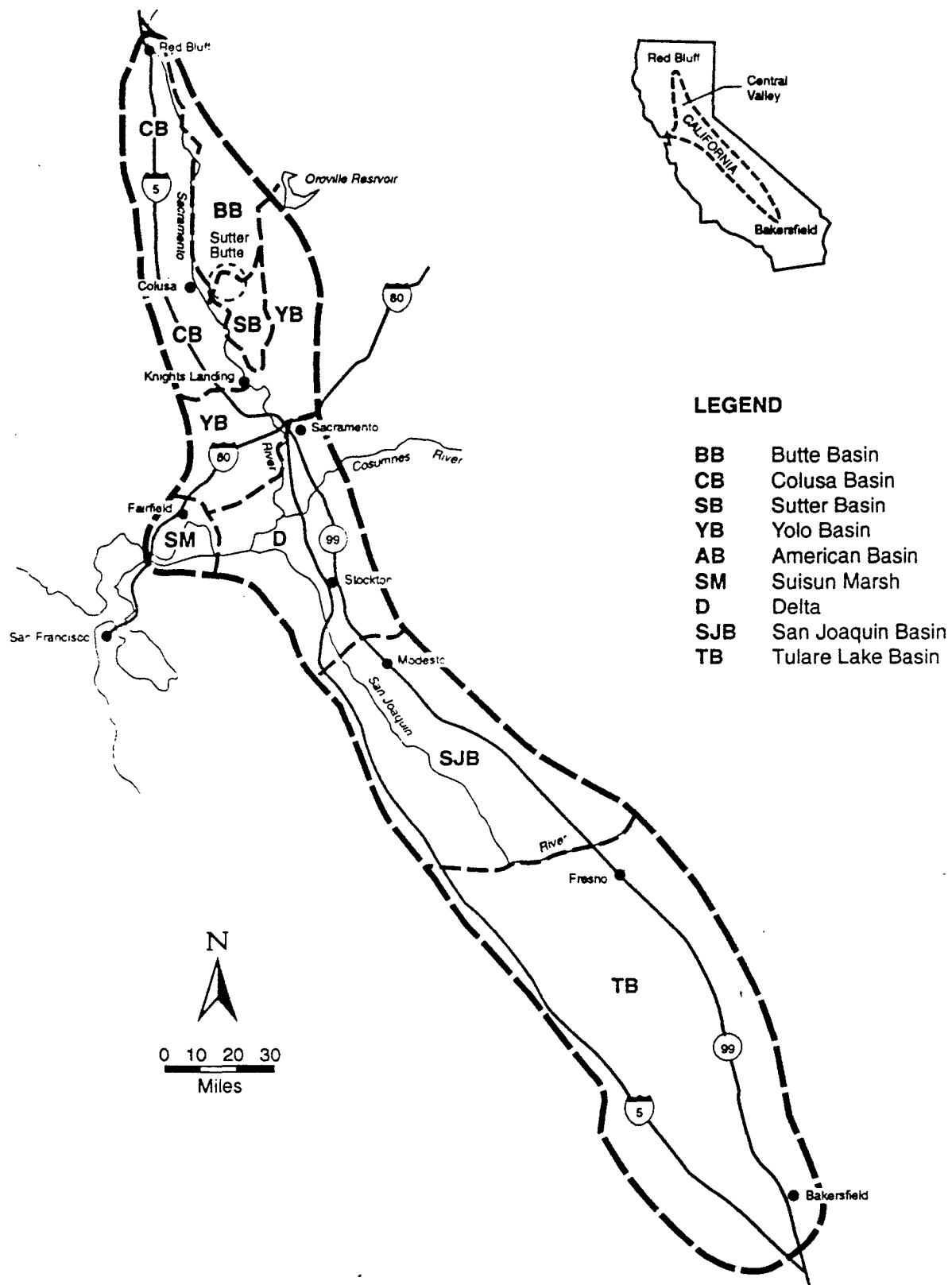
PURPOSE: The Central Valley Habitat Joint Venture (CVHJV) Implementation Plan identifies a primary goal and six objectives. The goal of CVHJV Implementation Plan is to "protect, maintain, improve, and restore habitat to increase waterfowl populations to desired levels in the Central Valley of California consistent with other objectives on the North American Waterfowl Management Plan (NAWMP)".

RECOMMENDATIONS: The six supporting objectives for CVHJV Implementation Plan are:

- Protect 80,000 additional acres of existing wetlands through acquisition of fee-title or perpetual conservation easements.
- Secure an incremental, firm 402,450 acre-foot water supply that is of suitable quality and is delivered in a timely manner for use by the National Wildlife Refuges (NWRs), State Wildlife Areas (WAs), and the Grasslands Resource Conservation District (GRCD).
- Secure Central Valley Project (CVP) power for NWRs, State WAs, GRCD, and other public and private lands dedicated to wetland management.
- Increase wetland areas by 120,000 acres and protect these wetlands in perpetuity by acquisition of fee-title or conservation easements.
- Enhance waterfowl wetland habitats on 291,555 acres of public and private lands.
- Enhance waterfowl habitat on 443,000 acres of agricultural lands.

Specific acreage, enhance, and restoration objectives are listed for each recommendation by basins (Figure 1) in the plan. The following tables list these objectives.

FUNDING: The habitat protection objective for the Delta is estimated at \$9.0 million to acquire 2,300 acres through fee title and \$0.7 million to acquire 700 acres through conservation easements. The majority of the State's funding for restoration programs will come from the following sources: California State Duck Stamp funds, California Wildlife Restoration Fund, California Endangered Species License Plate Fund, Ducks Unlimited MARSH funds, Federal Aid in Wildlife Restoration (Pittman-Robertson Act), private donations, cigarette taxes (Proposition 99), and California general ballot measures. Federal funding will be provided by the Land and Water Conservation Fund, the Migratory Bird Conservation Account (duck stamps), and the North American Wetland Conservation Act. It is anticipated that new sources of funding will be developed to help implement the Joint Venture. Funds for agricultural land enhancement incentive programs come from DFG, USFWS, USDA, DU, CWA, and other private sources when appropriate. Operation and maintenance costs of restored wetlands will



Source: Central Valley Habitat Joint Venture 1990.



Figure 1
Drainage Basins within the Central Valley of California

be borne by the private sector on those lands under conservation easements. Currently, no specific funding is available for this program. Federal, State, and private agencies coordinate their budgets and programs to help implement the CVHJV.

STATUS OF IMPLEMENTATION: In progress. Several projects have been completed toward these goals including Yolo Basin wetlands and Stone Lakes National Wildlife Refuge. Some of the basins have met their goals; others have not. Proposed completion by 2000.

RELATIONSHIP TO OTHER PLANS: The CVHJV Implementation Plan is one of several implementation plans directed by the North American Waterfowl Management Plan.

CONTACT: Dave Paulin, U.S. Fish and Wildlife Service, 2233 Watt Avenue, Suite 375, Sacramento, CA. (916)979-2710.

SOURCE: Central Valley Habitat Joint Venture. 1990. Central Valley Habitat Joint Venture Implementation Plan: a component of the North American Waterfowl Management Plan. February 1990. Sacramento, CA.

Table 1. Habitat acquisition objectives (in acres) for the Central Valley
Habitat Joint Venture, North American Waterfowl Management Plan

Basin ¹	Unprotected Wetlands	Concept Plan Objectives	CVHJV Objectives
Yolo	8,700	2,000	5,000
American	3,150	2,000	2,000
San Joaquin	67,000	49,500	52,500
Tulare	19,560 ²	5,000	5,000
Butte	12,200	10,000	10,000
Delta	4,300	6,000	3,000
Colusa	3,400	5,000	2,000
Sutter	500	500	500
Total	118,810	80,000	80,000

Notes:

¹ Basins are listed here in order of priority. Priorities were established using the percent of unprotected habitat (Table 4) as the ranking factor. A higher percent of unprotected habitat equates to higher priority. In cases where basins had equal portions of unprotected habitat, higher priority was given to the basin with the most wetland acres.

² Includes 5,600 acres in the Wilbur flood area and 8,600 acres in the Hacienda Ranch flood area. Only in winters of extremely high precipitation do these areas totally flood. In average precipitation years, less than 2,000 acres are flooded.

Table 2. Water Supply Needs (acre-feet) for National Wildlife Refuges, State Wildlife Areas, and the Grasslands Resource Conservation District in California's Central Valley

Basin	Area	Level 1	Level 2	Level 3	Level 4	Objective ¹ Needs
Colusa	Sacramento NWR		46,400	50,000	50,000	50,000
Colusa	Delevan NWR	0	20,950	25,000	30,000	30,00
Colusa	Colusa NWR	0	25,000	25,000	25,000	25,000
Sutter	Sutter NWR	0	23,500	30,000	30,000	30,000
Butte	Gray Lodge WA	8,000	35,400	41,000	44,000	36,000
Total Sacramento Valley		<u>8,000</u>	<u>151,250</u>	<u>171,000</u>	<u>179,000</u>	<u>171,000</u>
San Joaquin	Grassland RCD ²	50,000	125,000	180,000	180,000	130,000
San Joaquin	Volta WA	10,000	10,000	13,000	16,000	6,000
San Joaquin	Los Banos WA	6,200	16,670	22,500	22,500	18,000
San Joaquin	Kesterson NWR	3,500	3,500	10,000	10,000	6,500
San Joaquin	San Luis NWR	0	13,350	19,000	19,000	19,000
San Joaquin	Merced NWR	0	13,500	16,000	16,000	16,000
Tulare	Mendota WA	25,500 ³	18,500	24,000	29,650	4,150
Tulare	Pixley NWR	0	1,280	3,000	6,000	6,000
Tulare	Kern NWR	<u>0</u>	<u>9,950</u>	<u>15,050</u>	<u>25,000</u>	<u>25,000</u>
Total San Joaquin Valley		<u>95,200</u>	<u>211,750</u>	<u>302,550</u>	<u>326,650</u>	<u>231,450</u>
Total		103,200	363,000	473,550	505,650	402,450

Notes:

- Water Supply Level 1: Existing firm water supply.
- Water Supply Level 2: Current average annual water deliveries.
- Water Supply Level 3: Full use of existing development.
- Water Supply Level 4: To permit full habitat development.

- ¹ As of 1985, Grassland Resource Conservation District no longer receives agricultural drainage flows because of water quality concerns.
- ² Only 18,500 acre-feet can be delivered to the Mendota WA without modifications of existing facilities.
- ³ Objective level, additional firm water needs (Level 4 minus Level 1).

Table 3. Wetlands Restored in the California Central Valley, 1986 - 1989

Basin	CVHJV Objective (Acres)	Protected ¹ 1986-1989	Restored Acreage		Remaining Acres	
			Unprotected ² 1986-1989		To Restore	To Protect
Sutter	11,000	0	40		10,960	11,000
American	10,000	0	483		9,517	10,000
Delta	20,000	500	440		19,060	19,500
Butte	34,000	4,900	1,020		28,080	29,100
Yolo	10,000	0	255		9,745	10,000
Colusa	15,000	1,900	110		12,990	13,100
San Joaquin	20,000	0	20		19,980	20,000
TOTAL	120,000	7,300	2,368		110,332	112,700

Notes:

¹ Purchased fee-title or conservation easement.

² Privately owned and not within any State or federal easement program.

Table 4. Action and Strategies to Achieve the Wetland Enhancement Objective, Central Valley Habitat Joint Venture North American Management Plan

Action	Expected Results	Lead Entity	Schedule	Cost (per year)
1. Increase supplemental funding to federal and State Management Areas	86,715 acres @ \$25/ac/yr (30 percent of objective)	DFG, USFWS	--	DFG - \$1,092,375 USFWS - \$1,075,500
2. Expand availability and funding for SCS/ASCS Waterbank Program in counties where program not currently available	70,000 acres @ \$25/ac/yr SCS (24 percent of objective)	SCS	--	SCS - \$10.5 million per 10 years
3. Expand availability and funding for SCS/ASCS WL-2 Program by petitioning county committees and securing ACP money apportioned to WL-2	30,000 acres (10 percent of objective)	SCS	--	SCS - \$750,000
4. Implement California Waterfowl Habitat (Presley) Program	100,000 acres @ \$15/ac/yr DFG (34 percent of objective)	DFG	--	DFG - \$1.5 million
5. Expand DU MARSH program on private lands	30,000 acres @ \$25/ac/yr (10 percent of objective)	DU	--	DU - \$750,000
6. New technical assistance personnel*	--	USFWS (5 people)	--	\$300,000
		DFG (4 people)	--	\$240,000
		SCS (4 people)	--	\$240,000
		DU (2 people)	--	\$120,000
		CWA (2 people)	--	\$120,000
7. Disease Management Work Team	--	DFG (2 people & aircraft time)	--	\$200,000
8. Technical assistance coordination		CVHJV	--	Borne by respective participants

Note:

* These personnel are needed to implement Actions 1-5.

Table 5. Area (in Acres) of Agricultural Lands to be Managed Under Three Incentive Programs in the Nine Drainage Basins of the Central Valley of California

Basin	Incentive Program			Basin Total	Total Cost
	Deferred Tillage	Winter Flooding	Set-Aside Lands		
American	3,713	11,140	6,095	20,948	\$ 334,805
Butte	24,050	72,151	12,631	108,832	1,900,019
Colusa	21,093	63,268	26,924	111,285	1,824,828
San Joaquin	--	--	15,290	15,290	152,900
Suisun	--	--	--	--	--
Sutter	11,282	33,845	12,631	57,758	958,336
Tulare	4,951	14,854	5,540	25,345	420,558
Yolo	4,960	14,879	15,400	35,239	519,779
TOTAL	83,075	249,215	110,799	443,089	\$7,234,781

Table 6. Waterfowl Population (X 1,000) Objectives of the Central Valley
Habitat Joint Venture Relative to Those of the North American Waterfowl
Management Plan

Annual Period and Species	Central Valley	North America	Central Valley as Percent of Total
Breeding			
Total Ducks ^a	400	62,000	0.8
Mallard	300	8,700	3.4
Winter (peak)			
Total Ducks	4,700	a	a
Mallard	531	a	a
Pintail	2,800	a	a
Total Geese and Swans ^b	875	5,701	15.3
Cackling Canada	200	250	80.0
Aleutian Canada	5	5	100.0
Lesser snow	320	1,760	18.2
Ross	100	125	80.2
Tule white-fronted	5	5	100.0
Pacific white-fronted	200	300	66.7
Tundra swan	40	60	66.7

Notes:

^a No winter goals have been established in the NAWMP for ducks.

^b Reflects recent winter distribution patterns and adjusted for 25 percent annual recruitment.

DELTA WILDLIFE HABITAT PROTECTION AND RESTORATION PLAN

GEOGRAPHIC SCOPE: Within the San Francisco Bay and Delta.

PURPOSE: The goals of the Delta Habitat Plan are directed toward the continued existence of habitat resources in the Delta:

- Protect and improve important wildlife habitats, especially riparian and wetland types.
- Improve the variety of habitats and, where there are deficiencies, increase both habitat and wildlife diversity and numbers.
- Maintain habitats of all endangered species of plants and animals and give special attention to those habitats of rare and threatened species.
- Inform the public of the magnitude of the problems that threaten important wildlife resources in the Delta and propose mechanisms for better cooperation among local governments and between them and State and federal agencies in maintaining Delta habitats.

RECOMMENDATIONS: There are eight recommendations described in the management plan, which, if implemented, could enhance wildlife habitat protection and restoration.

- Enact legislation to require local governments of the Delta to develop, adopt, and implement local Delta programs.
- Establish an Office of Delta Coordination within the State of California Resources Agency.
- Local governments of the Delta adopt the significant resource areas identified in the plan as part of the open-space/conservation elements of their general plans and protect such areas with appropriate zoning.
- Reevaluate the existing classification of State lands in the Sacramento-San Joaquin Delta for possible upward reclassification to better protect areas possessing significant environmental values as identified in this report, pursuant to the provisions of the California Administrative Code, Title 2, Division 3, Section 2957 (a) and (b).
- The State Lands Commission seek funds and legislative directive to substantiate State ownership of lands in the Delta.
- The Department of Water Resources and U.S. Army Corps of Engineers revise levee design criteria and maintenance manuals in accordance with guidelines for levee vegetation management contained in this report.

- The U.S. Army Corps of Engineers seek to obtain administrative law procedures to expeditiously prosecute violations of its permit authority.
- Determine feasibility of publicly acquiring a Delta island for marsh and/or riparian restoration purposes.

FUNDING: Provided by federal and State levels as appropriate and with local governments, public interest groups, management authorization holders, project sponsors, and any other stakeholders.

STATUS OF IMPLEMENTATION: While this document is presented as a "plan", it is not implementable by DFG and USFWS. Neither agency has land use planning authority in the sense of enforceable county or city plans nor authority to issue land use permits. However, both the DFG and USFWS are committed to working toward implementation of these recommendations at federal and State levels as appropriate and with local governments, public interest groups, and individuals who share the concerns expressed in this report.

RELATIONSHIP TO OTHER PLANS: Four plans have a direct bearing on the Delta Habitat Plan and should be used as companion documents.

- Delta Master Recreation Plan,
- DAPC Delta Action Plan,
- U.S. Army Corps of Engineers Sacramento-San Joaquin Delta Environmental Atlas, and
- Protection and Restoration of San Francisco Bay Fish and Wildlife Habitat Study.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340. (916)979-2113.

SOURCE: Jones, Bruce E. and Don W. Kelley. 1980. Sacramento/San Joaquin Delta Wildlife Habitat Protection and Restoration Plan. California Department of Fish and Game/U.S. Fish & Wildlife Service. Sacramento, CA.

DESIGN AND BIOLOGICAL MONITORING OF WETLAND AND RIPARIAN HABITATS CREATED WITH DREDGED MATERIALS

GEOGRAPHIC SCOPE: Sacramento-San Joaquin River Delta.

PURPOSE: To document the success of habitat development on dredged materials placed within flooded levees and develop design criteria that could be used to guide future efforts for creation of freshwater marsh and riparian habitats.

RECOMMENDATIONS: Long-term monitoring of habitat developed to verify the results of this study.

FUNDING: U.S. Army Corps of Engineers.

STATUS OF IMPLEMENTATION: Completed in 1990 and has been translated in design guidelines that can be used with increased confidence to design new habitat using dredged materials.

RELATIONSHIP TO OTHER PLANS: Unknown.

CONTACT: Chief, Special Studies Branch, Sacramento District Corps of Engineers, 1325 J Street, Sacramento, CA 95814.

SOURCE: U.S. Army Corps of Engineers. 1990. Design and biological monitoring of the wetland and riparian habitats created with dredged materials. Final Report. Deep Water Channel Monitoring Program. Sacramento COE/FWS.

**GOALS FOR RESTORING A HEALTHY ESTUARY: REPORT ON RESULTS
OF A WORKSHOP OF ESTUARINE SCIENTISTS. NATURAL
HERITAGE INSTITUTE, OCTOBER 1995**

GEOGRAPHIC SCOPE: San Francisco Bay and Delta.

PURPOSE: This short report summarizes the results of a definitional workshop held on October 2, 1995 on developing goals for restoring a healthy estuary.

RECOMMENDATIONS: Specific geographic, species, or resource targets were not identified in the workshop report. Many of the goals recommended were global in concept and are provided here for information.

- Maintain sediment contamination at least below levels seen in 1950.
- Prevent conditions that result in water-column anoxia including harmful and nuisance algal blooms.
- Sustain natural evolution of baylands.
- Decrease turbidity of the water and increase seagrass habitat.

FUNDING: None.

STATUS OF IMPLEMENTATION: Not applicable.

RELATIONSHIP TO OTHER PLANS: None.

SOURCE: Natural Heritage Institute. 1995. Goals for restoring a healthy estuary: report on results of a workshop of estuarine scientists, October 2, 1995, Tiburon, CA. October 19, 1995. San Francisco, CA.

HABITAT MANAGEMENT PLAN FOR THE CANAL RANCH FISH AND WILDLIFE MANAGEMENT AREA

GEOGRAPHIC SCOPE: Canal Ranch, Sacramento-San Joaquin Delta.

PURPOSE: To increase benefits to water-dependent wildlife, develop riparian forest to benefit nesting Swainson's hawks and other neotropical migrants, improve waterside habitat for fish, and address fishery concerns related to entrainment of listed fish species in a manner that allows continued management of critical wetlands.

RECOMMENDATIONS: Development of levees and water control structures outlined in the plan would result in approximately 2,700 acres of high-quality wildlife habitat. The mosaic of habitats and their proposed juxtaposition will result in an area that is beneficial to many fish and wildlife species including several special-status species.

FUNDING: Collaborative funding efforts among Canal Ranch Partners, L.L.C.; DFG; the Wildlife Conservation Board; the U.S. Fish and Wildlife Service; and the California Department of Water Resources.

STATUS OF IMPLEMENTATION: Canal Ranch Partners, L.L.C. anticipates that it will realistically take 5-7 years to effectively and efficiently implement the habitat management plan. Staging construction of the infrastructure will help reduce up-front, one-time capital costs to install the area's infrastructure. In addition, experience gained implementing earlier stages will help guide later stages.

RELATIONSHIP TO OTHER PLANS: Unknown.

CONTACT: California Department of Fish and Game, Bay Delta and Special Water Projects Division, 4001 North Wilson Way, Stockton, CA 95205. (209) 948-7800.

SOURCE: California Department of Fish and Game. 1996. Habitat management plan for the Canal Ranch fish and wildlife management area. Stockton, CA.

LAND USE AND RESOURCE MANAGEMENT PLAN FOR THE PRIMARY ZONE OF THE DELTA - REVISED DRAFT

GEOGRAPHIC SCOPE: The Delta.

PURPOSE: To protect, maintain, and, where possible, enhance and restore the overall quality of the Delta environment, including, but not limited to, agriculture, wildlife habitat, and recreational activities; assure orderly, balanced conservation and development of Delta land resources and improve flood protection by structural and nonstructural means to ensure an increased level of public health and safety.

RECOMMENDATIONS: This plan includes recommendations for each identified use listed below.

Environmental Policies:

- Seasonal flooding should be carried out in a manner that minimizes mosquito production.
- Wildlife habitat on the islands should be of adequate size and configuration to provide significant wildlife habitat for birds, small mammals, and other Delta wildlife.
- Undeveloped channel islands should have a strategy developed to encourage permanent protection and management of channel islands.
- Feasible steps to protect and enhance aquatic habitat should be implemented as may be determined by resource agencies consistent with balancing other beneficial uses of Delta resources.
- Publicly owned land should incorporate, to the maximum extent feasible, suitable and appropriate wildlife protection, restoration, and enhancement as part of a Deltawide plan for habitat management.
- Management of suitable agricultural lands should be encouraged to maximize habitat values for migratory birds and other wildlife. Appropriate incentives, such as conservation easements, should be provided by nonprofit or other entities to protect this seasonal habitat through donations or purchases.

Utilities and Infrastructure:

- Railroad rights-of-way in and around the Delta should be protected as transportation corridors. Regional rail links between the Central Valley and the Bay Area should be developed for commuters as alternative transportation routes, removing traffic from Delta roadways.

- Bridges must be maintained to provide safe access across waterways; bridges should not be constructed so as to invite roadway expansion. Ferries should be maintained by the public entities as long as they are economically viable.
- The existing commercial shipping channels should be maintained and, if determined to be environmentally and economically appropriate, deepened to meet modern shipping needs. Expanded use of shallow draft vessels, such as barges, should be explored as a transportation alternative to highways. Material excavated from the shipping channels should, if feasible, be used for maintenance of Delta levees, for wildlife habitat enhancement within the Delta, and for other uses within the Delta.
- Materials dredged from Delta channels should, if feasible, be stored at upland sites for reuse for levee maintenance and repair and other feasible uses in the Delta. Impacts to wildlife caused by storage of dredged materials should be mitigated.
- The California Department of Transportation should designate, through appropriate signage, those roadways that are used to transport agricultural equipment and other slow-moving vehicles.
- Development of groundwater wells should be monitored to ensure wells do not result in overdraft and possible intrusion of saline water into groundwater supplies.
- Structures needed for gas extraction should be consolidated to minimize displacement of agriculture and wildlife habitat. In compliance with existing laws, facilities no longer needed for gas extraction should be completely removed to allow for restoration of agriculture or wildlife habitat uses. Counties should ensure that there are appropriate buffers between gas processing and storage facilities and residential and recreational uses to protect lives and property.
- Utilities should be required to contribute a fair share to the cost of levee maintenance and other local services and should not result in a reduction of assessable acreage for reclamation districts.

Land Use:

- A program by nonprofit groups or other appropriate entities should be developed to promote conservation easements on private lands with the goal of protecting agriculture and wildlife habitat in the Delta.
- A comprehensive survey and analysis by the State Lands Commission of the public trust lands in the Delta should be funded by the State to resolve private title/State sovereign interest issues in Delta lands.
- Public agencies and nonprofit groups have purchased or propose to purchase thousands of acres of agricultural lands to restore to wildlife habitat. The amount, type, and

location of land identified to be enhanced for wildlife habitat should be studied by wildlife experts to determine goals for future acquisition and restoration. Lands acquired for wildlife habitat should also be evaluated for recreation, access, research, and other needed uses in the Delta. Habitat restoration projects should not adversely affect surrounding agricultural practices. Public-private partnerships in management of public lands should be encouraged.

- Multiple use of agricultural lands for commercial agriculture, wildlife habitat, and, if appropriate, recreational use should be supported and funding to offset management costs pursued from all possible sources.
- Current spoil sites for dredge materials should not be allowed to be converted to industrial or other uses that preclude or limit their use as spoil sites.
- Development in the Secondary Zone should include an appropriate buffer zone to prevent impacts of such development on the lands in the Primary Zone.

Agricultural:

- Education should provide information about various crops and about the different agricultural regions.
- The State Lands Commission should review new information on best management practices to control subsidence of peat soils and, if appropriate, amend the plan.
- The five Delta county farm bureaus should coordinate on issues of joint concern.

Water:

- The Delta waterways should continue to serve as a primary transportation system, moving water to the State's natural and developed water systems.
- Delta water rights should be respected and protected.
- Programs to enhance the natural values of the State's aquatic habitats and water quality will benefit the Delta and should be supported;
- Programs to regulate agricultural drainage in the Delta should be accompanied by education programs, be implemented over time; and should, where needed, provide financial assistance, such as grants and interest-free loans, to ensure compliance. Any regulation of Delta agricultural discharges must recognize that a) discharges must be permitted to discharge back to the channels any dissolved solid loads that were derived from the channels in irrigation diversions and seepage inflows and b) any net addition of such compounds must be compared to the addition of such compounds that would

occur with any other land use option that would provide equal protection of the land and channel configuration and would consume no more water.

- Water for flooding to provide seasonal and year-round wildlife habitat should be provided as part of State and federal programs to provide water for wildlife habitat.
- Water quality monitoring programs should measure Delta waters to ensure they meet water-contract recreation and other water quality standards.
- State and federal water projects are beneficiaries of the Delta waterways and levees; the projects should fund that portion of levee erosion caused by water transport and should contribute to the maintenance of western Delta levees that are essential for efficient salinity control.
- Water quality at Delta drinking-water intakes should be maintained or enhanced.

Recreation and Access:

- Support a scientifically valid survey of current recreational uses and current and future recreation needs in the Delta to determine type, number, and location of needed recreational facilities. Study needs for trails, unified directional signage, and billboard controls in the Delta.
- Support a scientifically valid study of the carrying capacity of the Delta waterways for recreation activities without degradation of habitat values that minimize impacts to agriculture or levees.
- New projects in the Secondary Zone, adjacent to the Primary Zone, should include commercial and public recreation facilities that allow safe, supervised access to and along the Delta waterways.
- Marina owners and operators should take advantage of grants available from the Department of Boating and Waterways to fund new pump outs.
- To protect rare and endangered fish species from adverse impacts of poaching, DFG should study the feasibility and value of banning night fishing in the Delta.
- State and federal projects in the Primary and Secondary Zones should include appropriate recreational and/or public access components. State and federal agencies should consider private or user-group improvements on publicly owned lands to provide facilities.
- Local governments should develop design guidelines for new or enlarged recreation facilities to protect adjacent agricultural land uses.

- Local governments should develop funding sources to provide adequate enforcement of existing laws to protect health, safety, and welfare of Delta recreational users.

Levees:

- Levee maintenance, rehabilitation, and upgrading should be the highest priority activity of the levee.
- Landowners, through reclamation districts, should pay a portion of levee maintenance costs. The overall citizenry of California and the United States that benefits from the State and federal water projects, commerce and navigation, travel, production of crops, recreation, and protection of fish and wildlife habitat should also pay a substantial portion of the cost of maintaining the Delta levees.
- State and federal government should provide nonfundable allocations for regular, ongoing levee maintenance.
- Where efficiencies of scale would result in cost savings and levee systems of two or more reclamation districts would provide protection to the same area, the State and other regulatory agencies should consider approval of requests made by reclamation districts for such consolidation.
- If funding is made available to the reclamation districts for levee maintenance, mitigation for removal of vegetation required to maintain existing levees should be coordinated through a memorandum of understanding between reclamation districts, State, and federal agencies that results in minimal fiscal impacts to reclamation districts and that will result in no net long-term loss of habitat in the legal Delta.
- A clearinghouse for material suitable for levee maintenance should be created to assist in distributing appropriate materials to sites slated for maintenance work.
- Study appropriateness of materials from other sources for levee maintenance and repair similar to the long-term management strategy prepared for the San Francisco Bay region.
- To lower levee maintenance costs, streamlined permitting systems for authorization of dredging for levee maintenance and rehabilitation work, including improvements of wildlife habitat mitigation sites, and for upgrading levees to mandated standards to protect public health and safety should be instituted with one State and one federal agency designated as lead agencies. Federal agency concurrence in such designations should be obtained.
- A program should be established for emergency levee repair. The program should include a definition of an emergency; designation of emergency funds; emergency contracting procedures; emergency permitting procedures and the designation of a State

agency to provide immediate response to fight floods, close levee breaks, and dewater flooded areas where local agencies are unable to respond.

- Maintain an inventory of the current status of Delta levees in meeting various standards.
- Maintain an inventory of channel areas where toxic materials have been identified.
- Levee maintenance and fish and wildlife agencies should continue to cooperate to establish appropriate vegetation guidelines. Continuation of the Senate Bill 34 Program with its incentive funding for mitigation should be supported as the best way to accomplish the goals of levee maintenance with no net long-term loss of habitat.
- As much as is feasible, levees should be designed and maintained to protect against damage from seismic activity.

Marine Patrol, Boater Education, and Safety:

- The U.S. Coast Guard (Coast Guard) should host at least one and preferably two meetings per year of members of marine patrol programs to promote coordination and communication among the programs.
- California Department of Parks and Recreation (DPR) rangers should continue to patrol the State parks and provide as much supplemental assistance to local governments and to DFG as possible. DPR rangers should enforce hunting, fishing, and pollution laws on the waters of the State parks.
- DFG wardens and DBEEP staff should inform the Coast Guard of their general activities and special enforcement programs.
- A system for State peace officers to inform local government marine patrols of intoxicated boat operators should be developed and instituted.
- The California Department of Boating and Waterways should continue boating education programs and continue current programs to fund installation of new pump-out facilities.
- Nonprofit and volunteer organizations should continue to assist in patrolling the Delta and offering assistance, such as towing, to stranded boaters. Boater education and inspection programs carried out by volunteers should continue and should be promoted by all entities associated with Delta boating.
- The California Legislature should carefully and thoughtfully consider possible legislation and funding aimed at enhancing boater safety and welfare, which may be suggested by local and State enforcement programs or by nonprofit/volunteer groups, such as mandated boater training, hazard removal, hazard posting, and pollution cleanup.

- The California Legislature should designate adequate funding for boater education and marine patrol services.
- The California Legislature should consider possible legislation requiring boaters and jet-ski operators to attend boating education and safety programs.
- The Coast Guard should coordinate its vessel documentation program with the State to ensure that funds that would otherwise support boating programs are not diverted through the federal program.

FUNDING: Senate Bill 1866 - Delta Protection Act.

STATUS OF IMPLEMENTATION: Initiation is subject to the availability of funds within each agency required to participate.

RELATIONSHIP TO OTHER PLANS: Unknown.

CONTACT: Delta Protection Commission, P.O. Box 530, Walnut Grove, California 95690. (916) 776-2290.

SOURCE: California Department of Justice. 1994. Implementation of the resource management plan for the primary zone of the Delta, a report to the Delta Protection Commission. Office of the Attorney General, California Department of Justice. Sacramento, CA.

MONITORING MARSH MANAGEMENT ON THE SACRAMENTO NATIONAL WILDLIFE REFUGE COMPLEX

GEOGRAPHIC SCOPE: Sacramento National Wildlife Refuge Complex, Sacramento Valley, California.

PURPOSE: To manage the complex in the most efficient and productive manner possible. With the aid of a computer program, this allows the complex to carry out relatively consistent practices over time, uninterrupted by employee turnover. This also permits flexibility in tracking and comparing managements actions.

RECOMMENDATIONS: There are five recommended steps:

- Provide habitat and management for endangered or sensitive species.
- Provide wetland habitat of suitable quantity and quality for both wintering and resident waterfowl.
- Prevent or minimize migratory bird depredation of private croplands.
- Provide an area for compatible, management-oriented research.
- Provide for public use activities such as wildlife observation, hunting, fishing, and photography.

FUNDING: U.S. Fish and Wildlife Service.

STATUS OF IMPLEMENTATION: Field work begins in April or May (as habitat conditions permit) and is concluded by late October. Operations include pipe and riser repair or replacement, levee repair and construction, discing, habitat burns, irrigations, transplants, etc.

RELATIONSHIP TO OTHER PLANS: Unknown.

CONTACT: Sacramento National Wildlife Refuge; Greg Mensik; (916) 934-2801.

SOURCE: Mensik, J. Gregory, and Patrick O'Halloran. 1990. Monitoring marsh management on the Sacramento National Wildlife Refuge complex. Trans. Western Sect. Wildl. Soc. 26:24-28.

**NONINDIGENOUS AQUATIC SPECIES IN A UNITED STATES ESTUARY:
A CASE STUDY OF THE BIOLOGICAL INVASIONS OF THE
SAN FRANCISCO BAY AND DELTA - BIOLOGICAL STUDY**

GEOGRAPHIC SCOPE: San Francisco Bay and Delta.

PURPOSE: The focus of the study was to evaluate the effects of nonnative aquatic species on the ecological health of the San Francisco Bay and Delta.

RECOMMENDATIONS: The primary recommendations are for further research into certain areas to increase understanding of these invasions to the bay ecology. This research includes experimental ecology of invasions, such as regional shipping study, intraregional human-mediated dispersal vectors, study of the baitworm and lobster shipping industries, molecular genetics of invaders, increased utilization of non-native species, zebra mussel invasion studies; economic impacts of wood borers and fouling organisms; economic, ecological and geological impacts of bioeroding nonindigenous species; and post-invasion control mechanisms.

FUNDING: Unknown.

STATUS OF IMPLEMENTATION: NA.

RELATIONSHIP TO OTHER PLANS: None.

SOURCE: Cohen, A. N., and J. T. Carlton. 1995. Biological study: nonindigenous aquatic species in a United States estuary—a case study of the biological invasions of the San Francisco Bay and Delta. December. U.S. Fish and Wildlife Service, Washington, DC, and the National Sea Grant Program, Connecticut Sea Grant (NOAA Grant Number NA36RG0467).

NORTH AMERICAN WATERFOWL MANAGEMENT PLAN (NAWMP)

GEOGRAPHIC SCOPE: United States, Canada, and Mexico.

PURPOSE: To maintain and manage an appropriate distribution and diversity of high-quality waterfowl habitat in North American that will maintain current distributions of waterfowl and sustain an abundance of waterfowl similar to population levels during the 1970s.

RECOMMENDATIONS: Seven specific objectives are outlined in NAWMP. Two objectives directly apply to California: 1) to improve the quality of publicly managed habitat and protect and restore 80,000 additional acres of wintering habitat for pintails and other waterfowl in the Central Valley of California and 2) to maintain the habitat value of the Central Valley.

FUNDING: None.

STATUS OF IMPLEMENTATION: In progress. Proposed completion by 2000.

RELATIONSHIPS TO OTHER PLANS: NAWMP provided the initial direction for the Central Valley Habitat Joint Venture Implementation Plan.

SOURCE: U.S. Fish and Wildlife Service and Canadian Wildlife Service. 1986. North American waterfowl management plan: a strategy for cooperation. Minister of Environment Canadian Wildlife Service. ISBN 0-662-14905-X. U.S. Department of the Interior, Fish and Wildlife Service, Washington D.C.; and Environment Canada, Canadian Wildlife Service. Ottawa, Ontario, Canada.

NORTH-DELTA WATER MANAGEMENT PROJECT

GEOGRAPHIC SCOPE: Construction of the North-Delta Water Management Project would be confined to the northern part of the Delta, roughly in the vicinity of the small towns of Walnut Grove and Terminous.

PURPOSE: To increase the yield of the State Water Project and provide additional flood control for the northern delta area, particularly the towns of Walnut Grove and Thornton.

RECOMMENDATIONS:

Channel Enlargements:

- Avoid dredging as a means of enlarging channel capacities.
- Utilize setback levees as much as possible for achieving the channel enlargements.
- Develop oxbow areas in conjunction with the setback levees where opportunities exist.
- Where oxbow areas are created, raise their land elevations so that high-value woody riparian and other wetlands habitats can be created.
- Design channel enlargements with a goal of maximizing shallow, low-velocity, high-diversity aquatic areas with abundant cover.
- Avoid riprapping some of the levees that become channel islands under setback levee scenarios.
- Utilize replanting in association with setback levees to maximize wildlife mitigation and enhancement values.

Tidal Control Structures:

- Design structures to minimize the amount of inwater cover provided for predatory fish.
- Initially design any such control structures to be temporary.

Investigate the Concept of Wells with Water Collection Tubes

Examine the Concept of Island Floodways

FUNDING: No specified funding sources were identified.

STATUS OF IMPLEMENTATION: Implementation of the initial features of a staged mitigation plan would need to begin at least concurrent with and ideally before start of construction of the project.

RELATIONSHIP TO OTHER PLANS: Coprojects include the South Delta Water Management Project and the West Delta Water Management Project.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340. (916)979-2113.

SOURCE: U.S. Fish and Wildlife Service. 1990. Fish and wildlife resource impacts and compensation needs, north-Delta water management project -- a detailed assessment. U.S. Fish and Wildlife Service, Region 1. Portland, OR.

PLAN OF PROTECTION FOR THE SUISUN MARSH

GEOGRAPHIC SCOPE: Suisun Marsh, Southern Solano County.

PURPOSE: This report presents the plan of protection to mitigate the effects of the Federal Central Valley Project and the State Water Project on the Suisun Marsh. The State Water Resources Control Board (SWRCB) in Water Right Decision 1485 of August 18, 1978, set specific water quality standards for the Suisun Marsh. The U.S. Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR) were directed to meet the water quality standards by October 1, 1984.

Wildlife habitat in Suisun Marsh has been increasingly threatened by declining water quality and this plan of protection is a proposal to maintain water quality criteria in the marsh. Major categories in the plan are Delta outflow, physical facilities, a monitoring program, a management program, and an environmental impact report.

RECOMMENDATIONS: A primary management area would encompass 58,600 acres of tidal marsh; managed wetlands; and adjacent grasslands; and 29,500 acres of bays and waterways, most of which are already under the jurisdiction of San Francisco Bay Conservation and Development Commission. A secondary management area of about 27,897 acres would include grassland areas immediately adjacent to the marsh to act as a buffer between the marsh and surrounding developing areas. The plan also recommends that the State purchase approximately 1,800 acres of the marsh, that adequate water quality be maintained in the marsh, and that land tax-assessing practices reflect the need for a coordinated effort to protect the marsh.

FUNDING: The President of the United States signed federal legislation (HR4084 Fazio), which authorized Reclamation to pay half the cost (but not to exceed \$2.5 million) of planning, designing, constructing, operating, and maintaining the initial facilities of the plan of protection. An agreement was signed between DWR and Reclamation on February 18, 1982, and the funds have been transferred.

STATUS OF IMPLEMENTATION:

Components of the plan that have already been completed are:

- Phase I (also referred to as Initial Facilities)
 - Morrow Island Distribution System
 - Roaring River Distribution System
 - Goodyear Slough Outfall
- Phase II
 - Suisun Marsh Salinity Control Gates (also referred to as Montezuma Slough Control Structure)

Components to be considered for later phases include:

- Phase III
Boynton-Cordelia Ditch
- Phase IV
Cordelia-Goodyear Ditch
Goodyear Slough Culverts
- Phase V
Grizzly Island Distribution System
- Phase VI
Potrero Hills Ditch

RELATIONSHIP TO OTHER PLANS: On September 30, 1977, the State Legislature passed Assembly Bill 1717, which adopted the Suisun Marsh Protection Plan and provided for acquisition of land and easements within and around the marsh to ensure its protection.

The 1975 Water Quality Control Plan for the San Francisco Bay Basin, adopted by SWRCB, established standards to protect Suisun Marsh.

In 1987, USBR, DWR, DFG, and Suisun Resource Conservation District (SRCD) signed the Suisun Marsh Preservation Agreement.

In July 1991, DWR and Reclamation released the Scoping Report for the Proposed Western Suisun Marsh Salinity Control Project, Plan of Protection for the Suisun Marsh Phases III and IV.

CONTACT: Suisun Marsh Technical Advisory Committee, Department of Water Resources, 3251 S Street, Sacramento, California.

To receive TECHCOMM meeting announcements, agendas, and minutes, contact Kamyar Guivetchi at (916) 445-7094.

SOURCE: Department of Water Resources. 1984. Plan of protection for the Suisun Marsh including environmental impact report. The Resources Agency, Department of Water Resources, Central District.

**RECOMMENDATIONS FOR THE RECOVERY OF THE SACRAMENTO RIVER
WINTER-RUN CHINOOK SALMON, NATIONAL MARINE FISHERIES
SERVICE, SOUTHWEST REGION. MARCH 8, 1996**

GEOGRAPHIC SCOPE: Sacramento River.

PURPOSE: The purpose of the report is to provide recommendations on how to restore winter-run chinook salmon population to the Sacramento River.

RECOMMENDATIONS:

- The mean annual spawning abundance over 13 consecutive years shall be 10,000 females.
- Preserve and restore riparian habitat and meander belts along the Sacramento River and the Sacramento-San Joaquin Delta.
- Develop and implement a Sacramento River and Delta riparian habitat restoration and management plan.
- Protect and maintain gravel resources in the Sacramento River and its tributaries between Keswick and Red Bluff.
- Preserve and restore tidal marsh habitat.
- Reduce pollution in the Sacramento River from Iron Mountain Mine.
- Reduce pollution from industrial, municipal, and agricultural sources.
- Reduce habitat loss, entrainment, and pollution from dredging and dredge disposal operations.
- Provide suitable water quality in the Sacramento River watershed and the Sacramento-San Joaquin Delta and the San Francisco Bay-Estuary.
- Install temperature control device at Shasta Dam in conjunction with modifications to CVP operations.
- Operate and maintain temperature control curtains as permanent installations in Whiskeytown and Lewiston Reservoirs; investigate installation of additional temperature curtain on the upstream side of Lewiston.
- Modify Anderson Cottonwood Irrigation District (ACID) diversion dam.

- Maintain flows in the Sacramento River of 5,000 to 5,500 cfs from October through April. Develop, implement, and monitor final instream flow recommendations and ramping rates for the upper Sacramento River.

FUNDING: None.

STATUS OF IMPLEMENTATION: NA.

RELATIONSHIP TO OTHER PLANS: NMFS Biological Opinion for Sacramento River Winter-Run Chinook Salmon.

RESTORING CENTRAL VALLEY STREAMS - A PLAN FOR ACTION
CALIFORNIA DEPARTMENT OF FISH AND GAME
NOVEMBER 1993

GEOGRAPHIC SCOPE: Central Valley streams.

PURPOSE: The specific goals of this plan are to restore and protect threatened and endangered species. This would implement the State-legislated policy to double populations of anadromous fish in California.

RECOMMENDATIONS: The DFG document identifies specific actions for various streams in the report that were classified into the four categories below.

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED)

FISH POPULATIONS:

Antelope Creek - 3,000 fall-run and 2,000 spring-run.

HABITAT RESTORATION:

Restore spawning gravels in North Fork Battle Creek.

Big Chico Creek - eliminate siltation problems at One-Mile Dam.

Butte Creek - improve spawning and rearing habitat.

STRUCTURAL:

Battle Creek - install fish screens on agricultural diversion and all unscreened hydropower diversions;

Battle Creek - install effective water treatment system.

Bear Creek - install fish screens on all major water diversions.

Big Chico Creek - Relocate M&T pump station; repair or rebuild water control structures at Five-Mile Dam and Lindo Channel; inspect/repair existing fish ladders; reestablish the Upper Bidwell Park U.S. Geological Society (USGS) streamflow gage. Install water temperature thermograph.

Butte Creek - install fish screens on 11 agricultural diversions; correct fish passage problems at existing diversions.

FLOW-RELATED:

Battle Creek - increase releases from PG&E power plant diversions.

Bear Creek - negotiate for increased instream flows.

Bear River - complete instream flow study and increase flows.

Butte Creek - Acquire water rights from willing sellers; seek amendments to existing water rights and power licenses to provide additional flows.

JUSTIFICATION: None.

CRITERIA: None.

FUNDING: None.

STATUS OF IMPLEMENTATION: NA.

RELATIONSHIP TO OTHER PLANS: None.

RIPARIAN HABITAT JOINT VENTURE (RHJV)

GEOGRAPHIC SCOPE: Statewide.

PURPOSE: Eleven federal, State, and private organizations signed the cooperative agreement to protect and enhance habitats for native land birds throughout California. RHJV reinforces other collaborative efforts currently underway that protect biodiversity and enhance natural resources. By developing a coordinated statewide effort, fragmented habitat will be replaced with an extensive network of riparian forests capable of supporting viable breeding populations of native birds. A wide variety of plants and animals will benefit from these riparian corridors. Estimated percentages of riparian habitat remaining in California are between 2-10%.

RECOMMENDATIONS: Six specific objectives of RHJV are:

- Compile existing data on riparian habitat throughout the State to identify key riparian areas as well as information gaps. Promote and coordinate efforts to obtain needed information.
- Develop guidelines for protection of existing habitat on public lands and recommend alternatives for protection on private land, including fee title or perpetual easement acquisition and long-term cooperative management agreements with landowners, and develop support for protective zoning and tax incentives to secure protective management guidelines on public lands.
- Restore riparian habitats on public and private lands using commonly accepted, scientifically valid restoration techniques. Incorporate restored habitat into a long-term protection and management program as discussed above.
- Enhance the productivity and biodiversity of riparian communities using appropriate management techniques on public and private lands.
- Establish a network of high-quality riparian habitats throughout California to enhance and protect native birds.
- Educate the general public and resource managers about the value of California's riparian habitat to promote its protection and restoration.

FUNDING: Support may be accomplished by cooperative agreements, purchase and initiation of zoning and tax incentives on private lands, and management guidelines on public lands.

STATUS OF IMPLEMENTATION: The RHJV Implementation Plan is in progress.

RELATIONSHIP TO OTHER PLANS: None.

CONTACT: Marti Kie. 555 Audubon Place, Sacramento, CA. 95825. 916/487-5577

SOURCE: Riparian Habitat Joint Venture. 1994. Working agreement for the riparian habitat joint venture of the California Chapter of Partners in Flight. September 1994. Sacramento, CA.

**PROPOSED AGREEMENT ON SAN JOAQUIN RIVER PROTECTION
MAY 1996**

GEOGRAPHIC SCOPE: San Joaquin River.

PURPOSE: Restore the anadromous fishery in the San Joaquin River.

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED)

HABITAT RESTORATION: No specific measures were identified in the document.

STRUCTURAL: Old River Barrier Installation.

FLOW-RELATED:

Minimum flow of 1,000 cfs from October 1-31 and February 15-May 31.

31-day pulse flow for outmigrating salmon during the 61-day period from April through May.

Stanislaus River contribution to Vernalis flow requirement.

JUSTIFICATION: None.

CRITERIA: None

FUNDING: \$3.75 million from the CVPIA Restoration Fund and an estimated \$6 million from water users in the Friant Division (\$4.00 per acre-foot [af] surcharge on water used) for a total of about \$10 million.

STATUS OF IMPLEMENTATION: In progress.

RELATIONSHIP TO OTHER PLANS: Bay-Delta Accord.

MAPS/TABLES: None.

**SAN FRANCISCO ESTUARY PROJECT
COMPREHENSIVE CONSERVATION AND MANAGEMENT PLAN (CCMP)
JUNE 1993**

GEOGRAPHIC SCOPE: San Francisco Bay and Delta.

PURPOSE: The San Francisco Bay Estuary project is a 5-year cooperative effort that has involved the active participation of diverse environmental, social, and economic interests, to promote effective management of the San Francisco Bay-Delta Estuary and to restore and maintain its water quality and natural resources. The purpose of CCMP is to restore and monitor the integrity of shellfish, fish and wildlife, and recreational activities in the estuary.

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED)

FISH POPULATION: No specific fish population targets are provided in the report.

HABITAT RESTORATION:

Identify/protect remnant stream habitats.

Increase the quantity of shaded riverine aquatic habitat by 1,000%.

Identify, evaluate, and rank aquatic diversity management areas for the following streams:

Mount Diablo Creek,
Upper Wildcat Creek,
Upper San Leandro Creek,
Alameda Creek Drainage,
Coyote Creek Drainage,
Upper Guadalupe Creek,
Los Gatos Creek,
Saratoga Creek,
Upper Stevens Creek Drainage,
San Francisquito Creek Drainage,
Upper San Mateo Creek Drainage,
Novato Creek Drainage,
Miller Creek,
Corte Madera Creek,
Sonoma Creek Drainage,
Huichica Creek,
Petaluma Creek,
Napa River Drainage,
Suisun Creek Drainage,
Pinole Creek,
San Pablo Creek,
Walnut Creek.

Cosumnes River Drainage.
Mokelumne River Drainage,
Putah Creek, and
Marsh Creek.

STRUCTURAL:

Gated barrier at the head of Old River.
Gated barrier at Georgiana Slough.
Construct and operate feasible facilities that decrease loss of fishes.
Design, install, and effectively operate fish screens.
Reconstruct Tracy Fish Facility primary/secondary channels.

FLOW-RELATED:

Flow recommendations come from other documents (CVPIA etc.).

JUSTIFICATION:

CCMP is the product of a 5-year cooperative effort that is funded through Clean Water Act Section 320. The project is a part of the U.S. Environmental Protection Agency's (EPA's) National Estuary Program.

CRITERIA: None.

FUNDING: Clean Water Act grant funds.

STATUS OF IMPLEMENTATION: In progress.

RELATIONSHIP TO OTHER PLANS: CCMP incorporates and describes the goals and actions of many other federal and State programs including the upper Sacramento River management Plan.

MAPS/TABLES: None.

SACRAMENTO RIVER GREENWAY PLAN

GEOGRAPHIC SCOPE: Sacramento/Sutter County line at river mile 75.5 to slightly below the Freeport area at river mile 45.8.

PURPOSE: To provide the State Lands Commission and other public agencies with information to evaluate the level of marina development that could be accommodated in balance with other competing uses and resource protection in the Sacramento/Yolo County area of the Sacramento River. The goals of the plan are as follows:

- to preserve, protect, enhance, and restore the riparian corridor and its associated ecosystems, and
- to design a system of controlled public access for active and passive recreational uses related to the river.

RECOMMENDATIONS: The Sacramento River Greenway Plan has been initiated to coordinate resource management and public recreation access. In addition, there is a desire to pursue the Greenway project in an effort to more fully incorporate the state's ownership interests in navigable waterways and associated upland parcels. Furthermore, the Sacramento River Greenway Plan must be adopted by each local jurisdiction and the State Lands Commission prior to implementation of the Plan's goals and policies. Specific actions and implementation include the following:

- a public review period,
- the required California Environmental Quality Act (CEQA) review,
- public hearings, and
- an adoption of a resolution as a component of each of the jurisdictions' General Plan.

Also, a management entity will be created as a means of coordinating the implementation of the Greenway Plan. Implementation measures at either the local level or through the management entity may include, but are not limited to:

- specific design guidelines for development project,
- developing an acquisition priority list, and
- developing operations and maintenance plans.

Important considerations proposed in the Greenway Plan include:

LAND ACQUISITION:

- Priorities for land acquisition within the Greenway Plan are to acquire the most undisturbed or fragile land suitable for riparian habitat.

RIPARIAN HABITAT RESTORATION:

- Determine the original, undisturbed habitat for area in question.
- Retain the uniqueness and variety of habitat.
- Retain the diversity and richness of the species in the area.
- Ensure proximity of site to seed/plant sources to aid in natural and implemented restoration efforts.
- Determine size and shape of sites based on habitat restoration priorities.
- Prioritize sites based on proximity and connection to other areas of habitat value.
- Design aesthetics of habitat restoration so that it compliments existing habitat.
- Emphasize habitat restoration suited for threatened and endangered species in the area.
- Irrigation must take place 2-3 years after planting. Ensure availability of a nearby water source.
- Consider maintenance needs such as the availability of funds and personnel to care for site.

THE CHOICE OF PLANT SPECIES USED FOR HABITAT RESTORATION EFFORTS WILL BE BASED ON:

- Soils.
- Erosion control.
- Hydrology.
- Stream bank condition or stability.
- Flood potential.

FUNDING: Revenues to be sought via a managing entity. The managing entity has been created specifically for the purpose of establishing the implementation of a multi-jurisdictional Sacramento River Greenway Plan which would develop, manage, and operate the Greenway consistent with the plan as adopted. Sources of revenue include grants (State and federal).

development impact fees, and other sources. [See Appendix I (draft plan) - Potential Funding Sources].

STATUS OF IMPLEMENTATION: N/A

RELATIONSHIP TO OTHER PLANS: None.

CONTACT: County of Sacramento.
County of Yolo.
City of Sacramento.
City of West Sacramento.
State Lands Commission.

SOURCE: Sacramento Greenway: Draft Plan. 1992. County of Yolo. City of Sacramento. City of West Sacramento. State Lands Commission. December 1992.

SAN FRANCISCO ESTUARY PROJECT

GEOGRAPHIC SCOPE: San Francisco Bay and Delta estuary.

PURPOSE: The purpose of the San Francisco Estuary Project (SFEP) is to "promote more effective management of the San Francisco Bay-Delta Estuary and to restore and maintain the estuary's water quality and natural resources". In order to satisfy the purpose of SFEP, a Comprehensive Conservation and Management Plan (CCMP) for the estuary was developed. CCMP seeks to "achieve high standards of water quality; to maintain an appropriate indigenous population of fish, shellfish, and wildlife; to support recreational activities; and to protect the beneficial uses of the estuary".

RECOMMENDATIONS: There are 11 programs within the management plan that provide goals, recommendations, and objectives for the San Francisco Bay-Delta estuary. These include management of the following:

- aquatic resources.
- wildlife.
- wetlands majority/minority reports.
- pollution prevention and reduction, and use management
- research and monitoring.
- aquatic resources minority reports.
- wetlands management.
- water use.
- dredging and waterway modifications, and
- public involvement and education.

Four objectives were identified in the wildlife program area. Each objective has between one and five required actions. Objectives and actions specific to the San Francisco or San Pablo Bay were not included. The wildlife objectives and actions are listed below.

WL-1. Create and restore habitats critical to the survival of plant and animal populations and enhance the biodiversity of the estuary.

WL-1.1. Preserve, create, restore, and manage large, contiguous expanses of tidal saltmarsh and necessary adjacent uplands for the California clapper rail and the salt marsh harvest mouse. At least 15,000 acres are needed (in addition to the acreage listed in the wetlands management program and the planned acreage for the San Francisco National Wildlife Refuge listed under the below action).

WL-1.2. Complete the expansion of the San Francisco Bay National Wildlife Refuge and its satellite refuges and acquire the proposed Stone Lakes National Wildlife Refuge. Congressional budget augmentation should be provided to acquire the additional 22,000 acres authorized in the legislation for the expansion of the San

Francisco Bay National Wildlife Refuge. In addition, the U.S. Fish and Wildlife Service should continue to pursue acquisition of appropriate North Bay parcels for addition to the refuge as part of the normal planning process. Particular emphasis should be placed on the Napa River marshes. The U.S. Fish and Wildlife Service should continue to pursue the acquisition of the proposed Stone Lakes National Wildlife Refuge at no less than 18,200 acres, on a willing-seller basis, to be the keystone of a much larger (75,000-100,000 acres) north-Delta wetland package that could include Yolo Basin wetlands, the Putah Creek and Cache Creek riparian areas, Natomas wetlands, and the Cosumnes River Preserve. All acquisition strategies, including eminent domain, easements, and other methods addressed in the preceding action, should be employed as needed. Sovereign and public trust land should be managed consistent with the refuge purposed.

STATUS OF IMPLEMENTATION: Fair level of progress. Refuge acreages have increased for the San Francisco Bay Refuge (2,746 acres), San Pablo Refuge (774 acres), and Stone Lakes National Wildlife Refuge (4,830 acres).

WL-1.3. Implement concerted efforts to acquire wetlands already degraded or destroyed and restore them so that wetlands in the estuary are increased by 50% by 2000.

STATUS OF IMPLEMENTATION: Minimal progress. At least 9,500 acres of degraded or former wetlands have been restored or enhanced in the Bay-Delta region since 1993, and an additional 18,800 acres are in the process of being restored or enhanced.

WL-1.5. Identify and convert or restore nonwetland areas to wetland or riparian-oriented wildlife habitat.

WL-2. Develop a comprehensive wildlife management plan for the estuary

WL-2.1. Prepare a comprehensive management plan for the San Francisco Bay National Wildlife Refuge.

WL-2.2. Enhance the biodiversity within all publicly owned or managed wetlands and other wildlife habitats as appropriate.

STATUS OF IMPLEMENTATION: Fair level of progress. Suisun's Resource Conservation District is updating management plans and working on cost-share programs. Several other projects have increased biodiversity through wetland restoration and enhancement.

WL-2.3. Complete and implement a wildlife habitat restoration and management plan for the estuary.

STATUS OF IMPLEMENTATION: Minimal progress.

WL-3. Develop predator control programs to decrease the impact of introduced species on listed and candidate species, as well as on special-status species.

WL-3.1. Implement predator control programs in areas where introduced predators are a constraint to maintenance and restoration of native populations.

STATUS OF IMPLEMENTATION: Fair level of progress. Predator control has been increased for the San Francisco Bay Refuge and is being encouraged for private lands by resource agencies.

WL-4. Implement management measures necessary to ensure survival and recovery of listed and candidate species, as well as for special-status species.

WL-4.1. Update and, where necessary, prepare recovery plans for all listed wildlife species. Created and restored marshes acquired for this purpose should be sufficiently large (over 1,000 acres) to support extensive tidal channel systems. Priority sites are outlined in the Joint Clapper Rail and Salt Marsh Ecosystem Recovery Plan.

STATUS OF IMPLEMENTATION: Minimal progress: The Salt Marsh Ecosystem Recovery Plan is still in progress. Other new recovery plans are also in progress (snowy plover) or under consideration (vernal pools and California least tern).

WL-4.2. Provide secure colony sites, allow for population recovery, control predators, and protect adjacent foraging areas for the California least tern.

WL-4.3. Monitor status of all candidate species and list them if warranted.

WL-4.4. Continue hunting closures to protect the Aleutian Canada goose. Investigate the need for hunting closures for other waterfowl species as necessary.

STATUS OF IMPLEMENTATION: Full implementation. Hunting closures are enforced in Aleutian Canada geese ranges.

WL-4.5. Implement a captive breeding program for the clapper rail.

STATUS OF IMPLEMENTATION: Unknown or no longer applicable.

OBJECTIVES/ACTIONS: Four objectives were identified in the wetland management program area. Each objective has between one and four required actions. The wetland management objectives and actions are listed below.

WT-1. Create a comprehensive, estuarywide wetlands management plan.

WT-1.1. Prepare Regional Wetlands Management Plans(s). The plan should utilize, to the fullest extent possible, existing documents such as the Concept Plans for Waterfowl Habitat Protection (San Francisco Bay and Delta), Central Valley Habitat

Joint Venture, Suisun Marsh Protection Plan, and the San Francisco Bay Refuge Expansion Plan.

STATUS OF IMPLEMENTATION: Minimal progress. A Regional Wetlands Management Plan is in progress by the S.F. Regional Board. Additionally, a regional Wetlands Ecosystem Habitat Goals Process is expected in 1997 that will identify the types, amounts, and distribution of wetlands needed to sustain diverse and healthy wetland plant and animal communities in the Bay Area region.

WT-3. Protect existing wetlands using current, new, and expanded programs of wetland acquisition, easement agreements, and cooperative management systems.

WL-3.1. Expand wetlands acquisition programs or establish a new estuary-specific wetlands acquisition program.

STATUS OF IMPLEMENTATION: Fair level of progress. At least 26,470 acres of wetlands have been acquired since 1993 and size of the estuary's largest federal wildlife refuges have increased.

WL-3.2. Expand existing private, State, and federal financial and technical assistance programs to individual landowners.

STATUS OF IMPLEMENTATION:

WT-4. Expand the wetland resource base by restoring, enhancing, and creating wetland resources using a variety of approaches.

WT-4.1. Identify and convert nonwetland areas to wetland- or riparian-oriented wildlife habitat. Purchase nonwetland areas to create wetlands. This action should be guided by and consistent with the regional wetlands management plan. By coordinating with other efforts to acquire wetlands already identified as degraded or destroyed and restoring them, wetlands in the estuary will be increased by at least 50% by 2000 in accordance with State goals.

STATUS OF IMPLEMENTATION: Fair level of progress. At least 9,504 acres of wetlands have been restored or enhanced since 1993. Another 18,865 acres are in the process of restoration or enhancement. Additionally, over 40,000 acres in Suisun Marsh have been enhanced within the past 2 years.

FUNDING: The ability of the State to undertake any new fiscal responsibilities is severely limited. To the degree that funds are available or can be gained from other sources, the State will pursue recommendations that are determined to be the most cost effective.

RELATIONSHIPS TO OTHER PLANS: None.

CONTACT: San Francisco Bay Regional Water Quality Control Board, 2101 Webster Street, Suite 500, Oakland, CA 94612. (510) 286-0460.

SOURCE: San Francisco Estuary Project. 1994. Comprehensive conservation and management plan. Oakland, CA.

San Francisco Estuary Project. 1996. CCMP Workbook: Comprehensive Conservation and Management Plan for the Bay-Delta, Implementation Progress 1993-1996. June 1996. Draft. San Francisco, CA.

SAN JOAQUIN RIVER MANAGEMENT PLAN

GEOGRAPHICAL SCOPE: The scope consists of the San Joaquin River from Friant Dam downstream through the northern boundary of the South Delta Water Agency just south of Victoria Canal and includes all other tributaries of the San Joaquin River up to the first major dam.

PURPOSE: The purpose of the San Joaquin River Management Plan/Program (SJRMP) is to determine factors adversely affecting the San Joaquin River and its major and minor tributaries: the Merced, Tuolumne, Stanislaus, and Kings Rivers. The plan also examines the influence(s) that each of the San Joaquin's tributaries may have in contributing to the degradation of the San Joaquin River.

Assembly Bill 3603 authorizes SJRMP. This program will be conducted by an advisory council and an action team and its subcommittees. The advisory council includes representatives from counties and cities in the area; water user interests; and environmental, fisheries, and wildlife groups. Its function is to lend guidance and direction to the action team. Members of the action team were appointed by the advisory council. This smaller, staff-level group was formed specifically to identify problems in the San Joaquin Basin and begin looking for solutions. Action team subcommittees were formed in accordance with the legislation and are based on specific problem areas: flood protection, water supply, water quality, recreation, fisheries, and wildlife. Both the action team and its subcommittees are working to develop actions that would help restore the San Joaquin River system.

RECOMMENDATIONS: Recommendations of SJRMP fall into three categories: projects, studies, and acquisition. SJRMP outlines various projects, studies, and acquisitions or action items including: exotic vegetation removal, channel and spawning gravel work, Riparian Diversions - Pilot Screening Project, and recreation access. To stem the degradation in many reaches of the San Joaquin River system, the advisory council urges immediate implementation of as many of the action items listed in SJRMP as possible.

The SJRMP advisory council also recommended continued cooperation among users, regulatory agencies, and others who may be affected by the San Joaquin River Management Program.

Below are actions related to terrestrial projects, studies, and acquisitions.

- Develop a plan to restore and manage the riparian corridor of the San Joaquin River and its tributaries. Corridors would include areas on both sides of rivers where flood frequency is sufficient to sustain riparian vegetation. The plan's components would include: 1) restoring areas where the corridor is gone and 2) developing action items for riparian vegetation where value for fish and wildlife is reduced by land use practices such as conversion of land for agriculture, mining, and poorly managed grazing.
- Develop a riparian habitat restoration plan for the Andrew Firebaugh Historical Park.

- Develop and implement a program to restore and maintain the wildlife habitat and the floodflow capacity in the designated floodway of the mainstem, bypasses, and bifurcations of the San Joaquin River.
- Develop and implement a plan to remove false bamboo in the San Joaquin River and tributary channels and replace it with native vegetation compatible with flood control objectives.
- Adopt the wetland restoration objective of the Central Valley Habitat Joint Venture as a minimum goal.
- Evaluate potential benefits of land retirement to basin water quality in the San Joaquin Basin.
- Complete an inventory of shaded riverine aquatic habitat on the San Joaquin River and its major tributaries. Areas meeting the definition of this habitat would be plotted on recent aerial photographs of the San Joaquin River and tributaries.
- Acquire unprotected wetlands through easements, purchases, and fee entitlement for wetlands in the San Joaquin Basin. The habitat acquisition goal (outlined in the Central Valley Habitat Joint Venture Plan) for the San Joaquin Basin is 52,500 of the 67,000 acres of currently unprotected wetlands.
- Identify and acquire existing riparian habitat acres in the San Joaquin River Basin currently lacking long-term protection, starting with those that can most readily be protected or where active planning is underway to establish corridors or natural parkways.
- Establish a regional consortium of local, State, federal, and private parties to develop habitat conservation plans. Acquire core and "buffer" areas for special-status species (as developed in the regional plan and strategy) by easement or fee title or protect through some economic incentive.

FUNDING:

EXISTING FUNDING SOURCES:

- California Wildlife, Coastal and State Parks Initiative (Proposition 70)
- Central Valley Project Improvement Act
- Delta Pumps Fish Protection Agreement
- Environmental Restoration (Section 1135)

- Salmon Stamps Fund
- Sport Fish Restoration Program
- Tracy Pumps Mitigation Agreement
- Urban Stream Restoration Program

POTENTIAL NEW FUNDING:

- Legislation or congressional appropriation
- New bond acts

STATUS OF IMPLEMENTATION: SJRMP contains a number of proposed and existing projects. At the release date, many of the projects described in the plan were in the proposal stage, others were in progress, and some were completed. Because of the number of projects in SJRMP, it is recommended that one refer to SJRMP for further information regarding the status of specific projects.

RELATION TO OTHER PLANS: The Central Valley Project Improvement Act, which became law in October 1992, includes development of a comprehensive plan to address fish and wildlife habitat concerns on the San Joaquin River. Other related plans, as previously mentioned, are outlined and discussed in SJRMP.

CONTACT: Dave Koehler, San Joaquin River Parkway and Conservation Trust.

SOURCE: California Department of Water Resources. 1995. San Joaquin River management plan. February. Sacramento, CA. San Joaquin River Management Plan. 1995.

SB 34 DELTA LEVEES MASTER ENVIRONMENTAL ASSESSMENT (MEA)

GEOGRAPHIC SCOPE: Delta

PURPOSE: The purpose of the Master Environmental Assessment is to summarize the "environmental values" of the Delta. The MEA describes the diversity of habitats in the Delta, as well as the species and assemblages of plant and animal species which use them. Examples of such habitats include open water, levees, lakes and ponds, and agricultural fields.

RECOMMENDATIONS: The MEA has been prepared to serve primarily as a reference document for SB 34 work, assisting in determinations of cumulative impacts and "no net loss" determinations from projects. Other miscellaneous benefits to be provided by the MEA include:

ASSISTANCE IN STATE AND FEDERAL ENDANGERED SPECIES ACT COMPLIANCE:

- A current inventory of State and Federal Special Status species in the Delta.

PROGRAM POLICY VALUE:

- Information useful for the enhancement of cooperation among local government and State and Federal agencies.

DELTA-WIDE PLANNING TOOL:

- Methods for the protection of natural resources which have the potential for connecting the policies of local plans with the legislated authority and policies of the U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game (DFG), U.S. Army Corps of Engineers (Corps), and other public resource agencies.

TOOL FOR ZONING:

- Providing a resource for local governments of the Delta to use when adopting open space conservation elements of their general plans and thus protecting such elements with appropriate zoning.

PLAN DEVELOPMENT:

- Provide a basis for the future design of comprehensive management plans.

FUNDING: N/A

STATUS OF IMPLEMENTATION: N/A

RELATIONSHIP TO OTHER PLANS: This document serves as a background resource for the Mitigation Guidance Document (MGD). Various other documents that discuss Delta habitat values include:

- Ecological Studies of the Sacramento-San Joaquin Delta (Skinner, 1972).
- Environmental impact studies in connection with the Peripheral Canal, Delta Levee Investigation (DWR, 1982).
- U.S. Army Corps of Engineer's Environmental Atlas (1979).
- Delta Master Recreation Plan (DMRP), 1966 and 1973. Defined State Policy for the Delta, setting forth a main goal to protect and develop the Delta's scenic, wildlife and recreational resources.

CONTACT: California Department of Fish and Game, Environmental Services Division, 1416 Ninth St. Sacramento, CA. 95814. (916) 653-4875. A reference document that summarizes "environmental values" of the Delta.

SOURCE: SB 34 Delta Levees Master Environmental Assessment. October 1995.

SIERRA NEVADA ECOSYSTEM PROJECT

GEOGRAPHICAL SCOPE: Sierra Nevada Mountain Range.

PURPOSE: This project was requested by Congress in the Conference Report for Interior and Related Agencies 1993 Appropriations Act (H.R. 5503), which authorized funds for a "scientific review of the remaining old growth in the national forests of the Sierra Nevada in California, and for a study of the entire Sierra Nevada ecosystem by an independent panel of scientists, with expertise in diverse areas related to this issue." The emphasis of the report was to advise Congress on a range of options for implementation. The report is an environmental assessment that highlights what is known and presents individual and collective judgements about what this knowledge means for meeting the stated goal of protecting the health and sustainability of the Sierra Nevada while providing resources to meet human needs.

RECOMMENDATIONS: The report is diverse in scope. Topics of concern in this study range from Indexing the Current Watershed Conditions Using Remote Sensing and GIS to Biological Effects of Air Pollution in the Sierra Nevada. Because the project is so broad in nature, the focus of this summary is limited to two topics of discussion outlined in the study as well as the goals of each topic. The topics and their goals are as follows:

MANAGEMENT OF RIPARIAN AREAS IN THE SIERRA NEVADA:

GOALS:

- Identify and provide special protection for unusual/rare aquatic and riparian habitats and for rare, threatened, and endangered species that require riparian area.
- Maintain and restore wherever possible continuous corridors of riparian and upland habitat along streams for wildlife movement and migration.
- Identify riparian areas that are in best condition (i.e., dominated by native species, with most natural ecosystem structure and processes intact) and give such areas the highest priority for formal protection and intense management.
- Maintain water quality parameters (temperature, sediment load, pH, etc.) in associated water bodies within the natural range of conditions.
- Maintain or restore stream channel, pond, lake and wetland ecological integrity and natural processes to within the natural range of conditions.
- Maintain or restore stream channel or subsurface flows to levels that support the natural riparian and aquatic biotic system and maintain the natural functions of stream channels and aquifers.

- Maintain or restore the natural elevation, size, and lateral extent of subsurface water in meadows and wetlands.
- Maintain or restore the natural structure, diversity, and productivity of native riparian plant communities.
- Maintain or restore stands of large riparian trees in order to provide large woody debris for instream habitat.
- Maintain or restore riparian corridors to support well-distributed populations of plants and animals that depend on riparian and aquatic habitats for their movement and long-term survival.

RIPARIAN AREAS AND WETLANDS

GOALS:

- Halt disturbance in and around streams and riparian areas. Simply pulling back from streams and out of riparian areas should be a guiding philosophy to allow natural recovery processes to repair damaged functions of streambed areas.
- Management alternatives for areas of influence along streams should be evaluated on a local basis.
- Explore rehabilitation options where riparian functions are impaired.
- Reduce the direct and indirect impacts of roads on riparian and aquatic systems. An evaluation of road effects should be conducted.

FUNDING: Cost recovery for implementation of the strategies will require innovative approaches that might include establishing fees or markets or allocating rights to be traded.

STATUS OF IMPLEMENTATION: The SNEP project report has been completed. Implementation of the strategies that are described in the report will be on-going and will have contributions from federal, State, and local as well as private agencies.

RELATION TO OTHER PLANS: Unknown.

CONTACT: Center for Water and Wildland Resources. University of California. 1323 Academic Surge, Davis, CA. 95616-8750. (916) 752-8070.

SOURCE: Status of the Sierra Nevada. Volume III. Assessments, Commissioned Reports, and Background Information. Sierra Nevada Ecosystem Project, Final Report to Congress. June 1996.

**SOUTHERN SAN JOAQUIN VALLEY ECOSYSTEMS PROTECTION
PROGRAM - NATURAL LANDS INVENTORY**

GEOGRAPHIC SCOPE: The floor and western foothills of the southern San Joaquin Valley.

PURPOSE: To provide details from a natural lands inventory creating a foundation for planning future ecosystem and threatened and endangered species protection strategies in the southern San Joaquin Valley.

RECOMMENDATIONS: The results of the natural lands inventory illustrate a significant loss of natural habitat in the southern San Joaquin Valley. Opportunities to protect remaining habitat and allow for future development activities in this region still exist. The information available from the natural lands inventory can help in its development.

FUNDING: Unknown.

STATUS OF IMPLEMENTATION: This report has been finalized, maps are completed, and agencies proposing to restore habitat in the southern San Joaquin Valley are encouraged to reference the material.

RELATIONSHIP TO OTHER PLANS: Related to any other study initiated by the Southern San Joaquin Valley Ecosystems Protection Program.

CONTACT: California Energy Commission. 1516 Ninth Street, Sacramento, CA.

SOURCE: California Energy Commission. 1991. Southern San Joaquin Valley ecosystems protection program, natural lands inventory and maps. Staff report. P700-91-004. California Energy Commission, Energy Facilities Siting and Environmental Protection Division, Environmental Protection Office. Sacramento, CA.

**STATUS OF THE SIERRA NEVADA, VOLUME I, ASSESSMENT SUMMARIES
AND MANAGEMENT STRATEGIES,
CHAPTER 8, WATERSHEDS AND AQUATIC BIODIVERSITY;
SIERRA NEVADA ECOSYSTEM PROJECT,
FINAL REPORT TO CONGRESS
CENTERS FOR WATER AND WILDLAND RESOURCES,
UNIVERSITY OF CALIFORNIA, DAVIS, JUNE 1996**

GEOGRAPHIC SCOPE: Sierra Nevada Range (Oregon and Nevada borders south to terminus in Southern California).

PURPOSE: Aquatic and riparian systems are the most altered and impaired habitats of the Sierra Nevada. Restoration, better management, and research are needed to recover lost habitat, prevent further loss, and monitor efficacy of management. The purpose of Chapter 8 of the report was to present an assessment of the current status of the aquatic ecosystem in the study area and strategies and possible solutions for improving watersheds and aquatic biodiversity.

RECOMMENDATIONS: Strategies for improving watersheds and aquatic biodiversity had two goals: 1) improve the biotic integrity and sustainability of aquatic habitats and ecosystems in the Sierra Nevada, and 2) secure long-term social and economic benefits of a dependable supply of clean water from naturally functioning watersheds. The report discussed conditions that lead to deterioration and recommended an optimal strategy for preventing further degradation that includes all watersheds but recognizes their differences. The report presented seven possible general solutions: watershed focus, restoration of streamflow patterns, reserve systems and management practices, institutional innovations, restoration of native species, water-use payments, and monitoring. Specific actions associated with each of these possible solutions are presented below under each target.

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED)

FISH POPULATIONS: Restore runs of anadromous fish in the San Joaquin River below Friant Dam and the Kings River below Pine Flat Dam.

HABITAT RESTORATION: Reduce adverse impacts of land disturbances such as erosion, streambank instability, loss of riparian habitat, and the loss of large, woody debris and its recruitment. Reserve and protect key watersheds with natural flows and/or high biological integrity such as Deer and Mill Creeks, Clavey River, North Fork Calaveras River, Middle and South Forks Kings River, and the North and South Forks Kern River.

STRUCTURAL: No structural targets were identified.

FLOW-RELATED: Restore natural stream discharge regimes, voluntary adjustments in operations, conjunctive water use, and changes in timing and volume of releases. Tax water diversions to fund a conservancy or trust fund for watershed improvements.

JUSTIFICATION: NA.

FUNDING: None identified.

STATUS OF IMPLEMENTATION: NA.

SOURCE: University of California, Davis. Centers for Water and Wildland Resources. 1996. Sierra Nevada Ecosystem Project. Final report to Congress. June. Status of the Sierra Nevada. Volume I: assessment summaries and management strategies. Davis, CA.

STONE LAKES NATIONAL WILDLIFE REFUGE ENVIRONMENTAL IMPACT STATEMENT (EIS)

GEOGRAPHIC SCOPE: Southwestern Sacramento County, California.

PURPOSE: To present an overview of the final environmental impact statement on the U.S. Fish and Wildlife Service's proposed Stone Lakes National Wildlife Refuge project.

RECOMMENDATIONS: There are six alternatives considered in the final EIS. The preferred alternative would encompass 21,998 acres from Freeport south to the Mokelumne River. Existing habitats include perennial and seasonal wetlands, oak woodland, riparian habitat, annual grasslands, and vernal pools.

FUNDING: Approved by congress in 1988 and contingent on appropriations.

STATUS OF IMPLEMENTATION: This report has been finalized, circulated, and published in the Federal Register. A Record Of Decision (ROD) was expected in June 1992 stating which alternative has been selected and why, and specifying which alternatives are environmentally preferable.

RELATIONSHIP TO OTHER PLANS: None.

CONTACT: Peter Jerome, Refuge Manager, U.S. Fish and Wildlife Service, 2233 Watt Avenue, Suite 365, Sacramento, CA 95825, (916) 978-4420.

SOURCES: Bicknese, N. And T.E. Harvey. 1995. Environmental assessment wetland habitat restoration of the Lewis Ranch/Vyronis unit: Stone Lakes National Wildlife Refuge. Prepared for the U.S. Fish and Wildlife Service, Sacramento, CA.

U.S. Fish and Wildlife Service. 1992. Executive summary of final environmental impact statement: Stone Lakes National Wildlife Refuge. U.S. Fish and Wildlife Service, Pacific Region. Sacramento, CA.

THE NATURE CONSERVANCY'S BIOLOGICAL SCOPING PROJECT FOR THE SACRAMENTO VALLEY AND FOOTHILL BIOREGION

GEOGRAPHIC SCOPE: The Sacramento Valley and adjoining foothills.

PURPOSE: The Nature Conservancy (TNC) is to conduct a course-level analysis that is designed to identify highest priority ecological resources within the bioregion of Sacramento Valley and adjoining foothills. The primary purpose is to identify outstanding sites representing the full spectrum of threatened natural communities and endangered species of the project area.

RECOMMENDATIONS: The Sacramento Valley and Foothill Bioregion Biological Scoping Project provides a framework for the Nature Conservancy's internal long range planning process. The implementation of such a plan will encompass approximately 1.3 million acres and approximately 780 stream miles of core habitat. The goals and conclusions of TNC via this biological scoping project are:

- Protection of existing and restorable riparian and aquatic systems and related endangered species of the main-stem Sacramento River.
- Maintain bioregional fish and wildlife movement and hydrological integrity by protecting tributary ecosystems having extremely high quality riparian and aquatic habitats.
- Protect interconnected habitats of vernal pools, wildflower fields, blue oak woodlands, riparian corridors, and associated rare species for the maintenance of a natural community mosaic.
- Protect the full spectrum of vernal pool types of the Sacramento Valley.
- Protect all wetland basins considered critical to maintaining viable populations of wintering waterfowl and associated endangered wetland species of the Sacramento Valley.

FUNDING: N/A

STATUS OF IMPLEMENTATION: On going. The results of the analysis will be refined and updated as new biological information becomes available and upon completion of an assessment of threats and opportunities.

RELATIONSHIP TO OTHER PLANS: None stated, although is indirectly related to many similar efforts.

CONTACT: The Nature Conservancy.

SOURCE: The Nature Conservancy. 1995. Sacramento Valley and Foothill Bioregion Biological Scoping Project. The Nature Conservancy. San Francisco, CA.

THE NATURE CONSERVANCY'S SACRAMENTO RIVER PROJECT

GEOGRAPHIC SCOPE: Sacramento River between Red Bluff and Colusa.

PURPOSE: To protect and restore flood-prone land along the Sacramento River. The project involves riparian protection, restoration, and sustainable agriculture. By working with a number of public and private partners along the river's main stem, TNC seeks to develop and demonstrate examples of successfully integrated land use. Biologically and economically feasible methods of restoration are being explored and the focus is on the development of large-scale, cost-effective riparian restoration techniques that can be demonstrated to other landowners and managers interested in implementing riparian restoration. Wildlife utilization of restoration sites is also being evaluated. Restoration manuals have been prepared which outline the tools and techniques for riparian restoration.

RECOMMENDATIONS: TNC's Sacramento River Project has planted 613 acres of riparian forest along the Sacramento River as of fall 1996. This acreage value does not include restoration occurring from mitigation by public agencies. TNC is actively acquiring flood-prone lands from willing sellers and working with public partners in order to restore riparian forest to create large contiguous blocks. Future acreage goals for restoration activities include at least 2,726 acres of publicly managed orchard and row crops.

FUNDING: The Nature Conservancy.

STATUS OF IMPLEMENTATION: On going. Several projects have been completed while others are in the early stages of restoration.

RELATIONSHIP TO OTHER PLANS: Information included in this summary was from a letter from TNC to the USFWS. The riparian restoration effort by TNC's Sacramento River Project is part of their state-wide program to acquire, protect, and restore unique biologically important communities.

CONTACT: Marlyce Myers. The Nature Conservancy. Northern California Area Office, 1330 21st Street, Suite 103, Sacramento, CA 95814. Tel. 916-449-2850.

SOURCE: The Nature Conservancy. 1996. The Nature Conservancy's Sacramento River Project.

UPPER SACRAMENTO RIVER FISHERIES AND RIPARIAN HABITAT MANAGEMENT PLAN

GEOGRAPHIC SCOPE: Upper Sacramento River from Keswick Dam to Verona.

PURPOSE: The purpose of the Sacramento River Riparian Habitat Plan (also known as part of Senate Bill 1086) is to "preserve remaining riparian habitat and reestablish a continuous riparian ecosystem along the Sacramento River between the mouth of the Feather River and Keswick Dam".

RECOMMENDATIONS: The plan identifies 22 action items; the first two deal with protection and restoration of riparian habitat on the main stem of the Sacramento River and its tributaries, and the other 20 deal with actions to resolve fishery problems on the main stem and its tributaries. There are four recommendations described in the management plan requisite to the action items, which, if implemented, could enhance the probability of doubling the anadromous fisheries in the Sacramento River.

- State and federal legislation should be enacted as soon as possible to provide authority and funding needed to implement the actions contained in this management plan.
- The State of California should commit the necessary funding from a combination of Proposition 70, Proposition 99, and other sources to meet the State's share of the costs.
- The fishery and riparian habitat measures contained herein should be implemented in general conformance with the priorities indicated.
- State and federal legislation should be enacted to authorize an upper Sacramento River Advisory Council to facilitate implementation of the management plan.

DEVELOP THE SACRAMENTO RIVER RIPARIAN CONSERVATION AREA (SRRCA) PLAN. Conduct studies necessary to establish an inner river zone and conservation area boundaries. Complete planning necessary to identify boundaries, estimate costs, and develop legislation needed to implement the plan.

ESTABLISH THE SACRAMENTO RIVER RIPARIAN CONSERVATION AREA. Use acquisition through direct purchase, conservation easements, and transfer development rights for the protection of critical habitat areas. Additional methods of area establishment include "set-aside" agreements and tax incentives programs.

IMPLEMENT A SACRAMENTO RIVER RIPARIAN CONSERVATION AREA MANAGEMENT PLAN. SRRCA would be a legislated district managed by a governing board created and funded by Congress and the legislature. The board will include a balanced representation of participating landowners and public interest groups.

FUNDING: Capital costs of implementing this plan total about \$240 million, with annual costs of about \$9 million. Existing fund sources include:

- 1984 Fish and Wildlife Habitat Enhancement Bond (Proposition 19),
- California Wildlife, Coastal, and Parks Initiative (Proposition 70) - \$4 million,
- DFG - Fisheries Restoration (AB1705) - \$5 million over 2 years,
- Salmon Stamp Funds - \$200,000 to \$1,000,000 annually, depending on the year's catch,
- Environmental License Plate Fund - \$0 - \$3 million annually,
- Urban Stream Restoration Program - Up to \$300,000,
- Delta Pumps Fish Protection Agreement - \$15 million, and
- Cigarette and Tobacco Tax Benefit Fund Initiative (Proposition 99) - \$15 million.

STATUS OF IMPLEMENTATION: Action items are in various stages of consideration, some of which are already completed or under way. Toxic drainage in Spring Creek from Iron Mountain Mine is a high- priority item, already the focus of a cleanup plan developed by the U.S. Environmental Protection Agency.

RELATIONSHIP TO OTHER PLANS: Directly related to SB2261, The Anadromous Fisheries Program Act.

CONTACT: The Resources Building, 1416 Ninth Street, Sacramento, CA 95814, (916) 445-5656.

SOURCE: The Resource Agency. 1989. Upper Sacramento River: fisheries and riparian habitat management plan. January 1989. Sacramento, CA.

**UPPER SACRAMENTO RIVER FISHERIES AND
RIPARIAN HABITAT MANAGEMENT PLAN
JANUARY 1989**

GEOGRAPHIC SCOPE: Upper Sacramento River watershed.

PURPOSE: The purpose of the habitat management plan was to develop both instream and riparian habitat actions to improve habitat on the Upper Sacramento River. The plan identified 22 action items for consideration.

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED)

FISH POPULATIONS:

Deer Creek (2,000 spring-run, 3,000 fall-run, and 1,000 steelhead).
Butte Creek (4,000 spring-run, 2,000 fall-run, steelhead).
Big Chico Creek (1,000-2,000 spring-run and 500 steelhead).

HABITAT RESTORATION:

Spawning gravel restoration.
Clear Creek- reconstruct spawning riffles below dam.
Clear Creek- rip lower 6 miles to improve juvenile habitat.
Big Chico Creek- gravel replenishment below Five Mile;
Cottonwood Creek- gravel restoration on South Fork Cottonwood Creek below
Dippingvat Dam and on lower Cottonwood Creek below South Fork.

STRUCTURAL:

Red Bluff Diversion Dam modifications.
Renovate Coleman Fish Hatchery.
Glen-Colusa Irrigation District (GCID) Diversion.
Unscreened Diversions.
ACID Diversion Dam modifications.
Clear Creek -reconstruct fish ladder at McCormick-Saeltzer Dam.
Butte Creek - unscreened diversions, fish ladders at four dam locations.
Big Chico Creek - relocate M&T Ranch; control structures at Five Mile; redesign One
Mile Dam; redesign Iron Canyon and Five Mile fish ladders.
Enlarge Coleman National Fish Hatchery.
Construct a new hatchery below Keswick Dam.
Battle Creek - screen diversions of Pacific Gas and Electric Company (PG&E) facilities.

FLOW-RELATED:

Temperature and turbidity.

Improve Sacramento River flow regime.
Improve flows in Deer Creek.
Increase flows in Clear Creek.
Increase flows in Big Chico Creek.
Increase bypass flow releases from project diversions in Battle Creek.

JUSTIFICATION: Senate Bill 1086.

CRITERIA: None.

FUNDING: 1984 Fish and Wildlife Habitat Enhancement Bond, California Wildlife, Coastal and Parks Initiative, DFG Fisheries Restoration Fund, Salmon Stamp Funds, Environmental License Plate Fund, Urban Stream Restoration Fund, Delta Pumps Fish Protection Agreement, Federal Aid in Sport Fish Restoration Program, Cigarette and Tobacco Tax Benefit fund.

STATUS OF IMPLEMENTATION: Various elements of the program have been implemented.
The M&T pump station on Big Chico Creek was relocated to the Sacramento River in August 1996.

RELATIONSHIP TO OTHER PLANS: None.

MAPS/TABLES: None.

**U.S. FISH AND WILDLIFE SERVICE FINAL REPORT - EVALUATION OF THE
SACRAMENTO RIVER SPAWNING GRAVEL RESTORATION PROJECT AND WINTER-
RUN CHINOOK SALMON REDD SURVEY, 1987-1993
APRIL 1996**

GEOGRAPHIC SCOPE: Upper Sacramento River near Redding.

PURPOSE: Restoration of gravels in the segment of the Sacramento River from Keswick Dam (River Mile 302) to the mouth of Cottonwood Creek (RM 273.5).

TARGETS: (FISH POPULATIONS, HABITAT RESTORATION, STRUCTURAL, FLOW-RELATED)

HABITAT RESTORATION:

Continue gravel replenishment program at stockpiling site Keswick (RW 302), Salt Creek (301) and Shea Levee (RM290).

JUSTIFICATION: Mitigation required for CVP operations.

CRITERIA: None.

FUNDING: U.S. Bureau of Reclamation and DFG.

STATUS OF IMPLEMENTATION: Project has been implemented. The final report recommends continued gravel replenishment.

RELATIONSHIP TO OTHER PLANS: Linked to the upper Sacramento River Fisheries and Riparian Habitat Management Plan.

MAPS/TABLES: None.

WETLANDS AND RELATED HABITATS IN THE SAN FRANCISCO ESTUARY - STATUS AND TRENDS REPORT

GEOGRAPHIC SCOPE: San Francisco Estuary.

PURPOSE: To describe the values and functions of wetlands, trace the loss and conversion of these important habitats, describe the factors responsible for the losses, and project trends in their distribution.

RECOMMENDATIONS: It was agreed by the members of the Wetlands Subcommittee that any program designed to restore the physical, chemical, and biological integrity of the San Francisco Bay/Delta Estuary must achieve the following goals relating to the estuary's wetland resources:

- Protect existing wetlands.
- Restore and enhance the ecological productivity and habitat values of wetlands.
- Expedite a significant increase in the quantity and quality of wetlands.
- Educate the public about the values of wetland resources.

FUNDING: Several sources of funding may be available for wetlands acquisition and restoration projects such as flood control monies, recreation funds, and special bonding. and from entities such as the State Coastal Conservancy and The Nature Conservancy.

STATUS OF IMPLEMENTATION: There are recent developments and trends that may facilitate protection and management including:

- stronger political support for protection of wetlands;
- better planning tools available to local jurisdictions, State, and federal agencies;
- local jurisdictions and special districts increasingly preparing hydrologic studies on a watershed basis for multiobjective planning for water quality, flood control, and stormwater management; and
- developers willing to spend large sums of money on impact reduction and restoration because the purchasers of subdivision lots or houses and commercial tenants want parks, trees, open spaces, and high water quality.

RELATIONSHIP TO OTHER PLANS: Other publications of the San Francisco Estuary Project include six status and trend reports, eight technical reports, and 12 information brochures that can be obtained from the San Francisco Estuary Project.

CONTACT: San Francisco Estuary Project, P.O. Box 2050, Oakland, CA 94604-2050. (510) 464-7990.

SOURCE: Association of Bay Area Governments. 1991. Status and trends report on wetlands and related habitats in the San Francisco Estuary. Prepared under cooperative agreement #815406-01-0 with the U.S. Environmental Protection Agency by the Association of Bay Area Governments, Oakland, CA.

WETLANDS OF THE CALIFORNIA CENTRAL VALLEY - STATUS AND TRENDS REPORT

GEOGRAPHIC SCOPE: The Central Valley from Tehama County to Fresno County.

PURPOSE: To estimate net losses or gains of wetlands between 1939 and the mid-1980s and provide estimates of abundance of the Central Valley wetlands and deepwater habitats.

RECOMMENDATIONS: Recommendations were not submitted to restore wetlands, instead, the report describes the reasons for the loss of wetlands and their importance to wildlife species, particularly waterfowl.

FUNDING: None.

STATUS OF IMPLEMENTATION: Has been submitted.

RELATIONSHIP TO OTHER PLANS: Related to the National Wetlands Inventory conducted by the U.S. Fish and Wildlife Service.

CONTACT: U.S. Fish and Wildlife Service, National Wetlands Inventory Center, 9720 Executive Center Drive, Suite 101 Monroe Building, St. Petersburg, FL 33702. (813) 570-5412.

SOURCE: Frayer, W.E., Dennis D. Peters and H. Ross Pywell. 1989. Wetlands of the California Central Valley - status and trends- 1939 to mid-1980s. U.S. Fish and Wildlife Service, Region 1, Portland, OR.

YOLO BASIN WETLANDS CREATION AND RESTORATION PROJECT

GEOGRAPHIC SCOPE: The Yolo Basin west of the Sacramento River between Cache Creek and the Montezuma Hills and the Sacramento-San Joaquin Delta.

PURPOSE: To create and restore the wetlands within the Yolo Basin area.

RECOMMENDATIONS: The U.S. Fish and Wildlife Service recommends that the U.S. Army Corps of Engineers:

- pursue full implementation of DFG's present plan (MP1) for the Mace Ranch parcel;
- work with DFG and USFWS to change the primary focus of the plan proposed for the railroad parcel from raptor enhancement to wetlands creation and restoration, or move the raptor enhancement effort to a better-suited location outside the Yolo Bypass;
- delay any further plans to participate in the development of the Davis parcel pending resolution of the water quality concerns for fish and wildlife as discussed above in this report;
- implement, for any of the three parcels where the proposed wetlands project is actually completed, a definitive, long-term contaminants monitoring program for both water and fish and wildlife resources;
- if recommendations 2 and 3 above prove impractical, consider withdrawing Corps participation in the railroad and Davis parcels and using all Corps resources savings to expand, or replicate elsewhere, basic plans for the Mace parcel;
- incorporate into all plans greater use of riparian buffer strips and/or permanent wetlands around parcel perimeters and sensitive wildlife areas to further limit human access, especially near sensitive wildlife species and habitats;
- incorporate into all plans more strategic placements of cover types adjacent to one another to maximize the "edge" effect between different cover types and ecotones;
- for any railroad parcel plans, leave the existing, non-native eucalyptus forest in place until the restored riparian forest cover is partly established, then remove the eucalyptus trees, except for a few to provide winter foraging habitat for hummingbirds;
- for the railroad and Mace parcels, consider implementing a new option, not discussed previously or analyzed, of using these areas for borrow material for levee improvement projects in the Sacramento metropolitan area (with sufficient borrow removal, substantial additional permanent and seasonal wetlands and woody riparian vegetation could then be established without impeding bypass flood capacities);

- for the Mace Ranch parcel, evaluate alternatives involving use of the South Fork of Putah Creek as a water supply (increasing flows in Putah Creek for the Mace parcel could have multiple benefits for a wide range of riparian- and wetland-dependent resources); and
- for the Mace parcel, where a high proportion of the existing agriculture lands have been lazer-leveled, plan to create greater habitat diversity by constructing numerous islands and depressions in the landscape.

FUNDING: Funding would be provided primarily by the U.S. Army Corps of Engineers.

STATUS OF IMPLEMENTATION: The California State Legislature, through its Senate Concurrent Resolution 28, has set a goal for the State to increase wetland acreage by 50% by 2000. This goal will be achieved as appropriations, priorities, and other budgetary considerations allow.

RELATIONSHIP TO OTHER PLANS: No prior reports or planning aid letters have been prepared for this proposed project by the U.S. Fish and Wildlife Service.

CONTACT: U.S. Fish and Wildlife Service, Ecological Services, 3310 El Camino Avenue, Suite 130. Sacramento, CA 95821-6340. (916)979-2113.

SOURCE: U.S. Fish and Wildlife Service. 1991. Yolo Basin wetlands creation and restoration project, a detailed report on fish and wildlife resources. U.S. Fish and Wildlife Service, Region 1, Portland, OR.

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